

# Service Manual

Video Cassette Recorder

**Panasonic**  
 Omnivision **VHS**
**PV-1220**

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**VHS**
**Panasonic®**

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# Service Manual

**Vol. 1**

Video Cassette Recorder

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**PV-1220**

## Summary

### SPECIFICATIONS

Power Source: 120V AC  $\pm 10\%$ , 60Hz  $\pm 0.5\%$   
 Power Consumption: Approx. 18 watts  
 Television System: EIA Standard (525 lines, 60 fields)  
 NTSC color signal

#### Video Recording

System: 2 rotary heads, helical scanning system  
 Luminance: FM azimuth recording  
 Color signal: Converted subcarrier phase shift recording

Audio Track: 1 track

Tape Format: Tape width 1/2" (12.7mm), high density tape

Tape Speed: SP mode: 1-5/16 i.p.s. (33.35mm/s)  
 LP mode: 21/32 i.p.s. (16.67mm/s)  
 SLP mode: 7/16 i.p.s. (11.12mm/s)

Record/Playback Time: 8 HRS. with 160 min. type tape used in SLP mode

FF/REW Time: Less than 6 min. with 120 min. type tape

Heads: Video: 2 rotary heads  
 Audio/Control: 1 stationary head  
 Erase: 1 full track erase  
 1 audio track erase

Input Level: Video: VIDEO IN Jack (RCA type)  
 1.0Vp-p, 75 $\Omega$  unbalanced  
 Audio: AUDIO IN Jack (RCA type)  
 -20dB, 50k $\Omega$  unbalanced

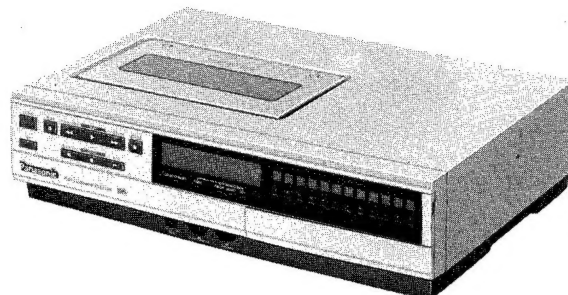
TV Tuners: VHF Input: VHF Ch2-Ch13,  
 75 $\Omega$  unbalanced  
 UHF Input: Ch14-Ch83,  
 300 $\Omega$  balanced

Output Level: Video: VIDEO OUT Jack (RCA type)  
 1.0Vp-p, 75 $\Omega$  unbalanced  
 Audio: AUDIO OUT Jack (RCA type)  
 -6dB, 600 $\Omega$  unbalanced

RF Modulated: Ch3/Ch4 switchable,  
 72dB $\mu$ , (Open Voltage)  
 75 $\Omega$  unbalanced

#### Video Horizontal

Resolution: Color: more than 230 lines  
 B/W: more than 230 lines



#### Audio Frequency

Response: SP mode: 100Hz ~ 8kHz  
 (10dB down) LP mode: 100Hz ~ 6kHz  
 SLP mode: 150Hz ~ 5kHz

Signal-to-Noise Ratio: Video: SP mode: better than 41 dB  
 LP mode: better than 41 dB  
 SLP mode: better than 41 dB  
 (Rohde & Schwarz noise meter)  
 Audio: SP mode: better than 42 dB  
 LP mode: better than 40 dB  
 SLP mode: better than 40 dB

#### Operation

Temperature: 41°F—104°F (5°C—40°C)  
 Operating Humidity: 10%—75%  
 Weight: 13.0 lbs. (5.9kg)  
 Dimensions: 16-15/16" (W)  $\times$  11-5/8" (D)  $\times$  4-1/4" (H)  
 (430mm  $\times$  295mm  $\times$  108mm)

Accessories Supplied: • Remote control unit  
 • VHF connecting cable  
 • 300 $\Omega$ —75 $\Omega$  transformer  
 • Twin-lead cable

Available Tapes: 1/2" VHS video cassette tapes  
 NV-T160 Approx. 1073 ft. (327m), 160,  
 320, or 480 min  
 NV-T120 Approx. 810 ft. (247m), 120, 240,  
 or 360 min  
 NV-T60 Approx. 417 ft. (127m), 60, 120,  
 or 180 min.

Weight and dimensions shown are approximate. Specifications are subject to change without notice.

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# INTRODUCTION

This Service Manual contains information which will allow the service technician to understand and service the Panasonic VHS recorder Models PV-1230, PV-1222, PV-1225 and the various accessories that complement the deck.

For a detailed technical explanation, please refer to the Training Manual on these models.

Some of the Features incorporated in these models are: soft touch controls, 12 position Electronic Tuner; 2 week/1 program Timer, Wired Remote Control (PV-1230: 5F, PV-1222/PV-1225: 1F), One Touch Record Button (O.T.R), Picture Search in SP, LP and SLP, STILL Picture in SLP, Light Editing, Auto Rewind, Frame Advance in SLP, SLOW Picture in SLP.

These 3 models use a multi-function display indicator which combines indicators for time, tape counter, speed, transport functions, and timer record into one easy to read digital display.

The above features plus the VHS format make the PV-1230/PV-1222/PV-1225 table top VCR's an excellent unit for your enjoyment.

Just slightly ahead of our time...Panasonic

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# SAFETY PRECAUTIONS

## GENERAL GUIDELINES

1. When servicing, observe the original lead dress. If a short circuit is found, replace all parts which have been overheated or damaged by the short circuit.
2. After servicing, see to it that all the protective devices such as insulation barriers, insulation papers shields are properly installed.
3. After servicing, make the following leakage current checks to prevent the customer from being exposed to shock hazards.

## LEAKAGE CURRENT COLD CHECK

1. Unplug the AC cord and connect a jumper between the two prongs on the plug.
2. Measure the resistance value, with an ohmmeter, between the jumpered AC plug and each exposed metallic cabinet part on the equipment such as screwheads, connectors, control shafts, etc. When the exposed metallic part has a return path to the chassis, the reading should be between  $1\text{M}\Omega$  and  $5.2\text{M}\Omega$ . When the exposed metal does not have a return path to the chassis, the reading must be  $\infty$ .

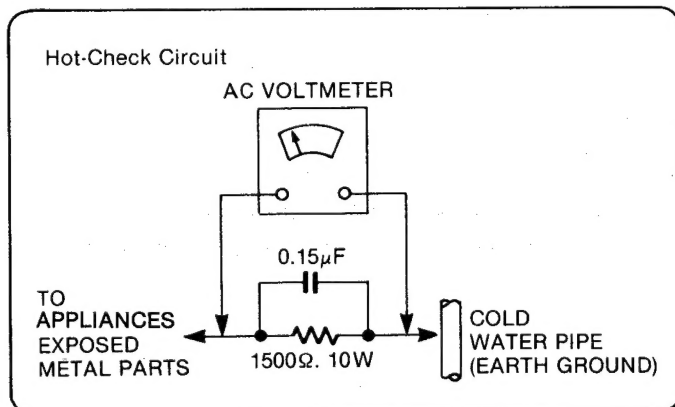


Figure 1

## LEAKAGE CURRENT HOT CHECK (See figure 1.)

1. Plug the AC cord directly into the AC outlet. Do not use an isolation transformer for this check.
2. Connect a  $1.5\text{k}\Omega$ , 10 watts resistor, in parallel with a  $0.15\mu\text{F}$  capacitor, between each exposed metallic part on the set and a good earth ground such as a water pipe, as shown in figure 1.
3. Use an AC voltmeter, with 1000 ohms/volt or more sensitivity, to measure the potential across the resistor.
4. Check each exposed metallic part, and measure the voltage at each point.
5. Reverse the AC plug in the AC outlet and repeat each of the above measurements.
6. The potential at any point should not exceed 0.75 volts RMS. A leakage current tester (Simpson Model 229 or equivalent) may be used to make the hot checks, leakage current must not exceed 1/2 milliamp. In case a measurement is outside of the limits specified, there is a possibility of a shock hazard, and the equipment should be repaired and rechecked before it is returned to the customer.

# ELECTROSTATICALLY SENSITIVE (ES) DEVICES

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.  
CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device).

## "NOTE to CATV system installer:

This reminder is provided to call the CATV system installer's attention to Article 820-22 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical".

# FEATURES

Your Panasonic VCR has these special features to enhance your viewing enjoyment.

**Watch one channel while recording another**

**Fine-editing**

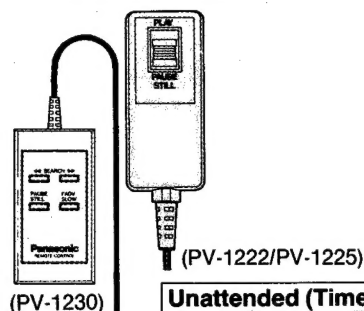
**Cable-ready**

(Only PV-1230)

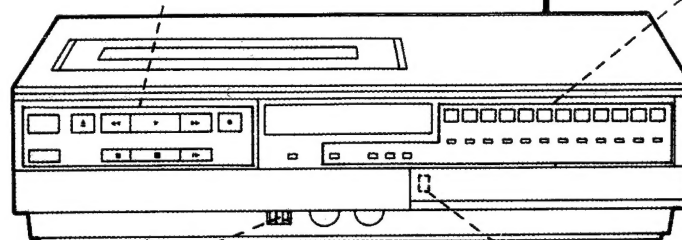
**Multi-motion playback**

- Fast Search
- Still picture
- Frame Advance
- Slow-motion

**Remote Control**



**Unattended (Timer) Recording**

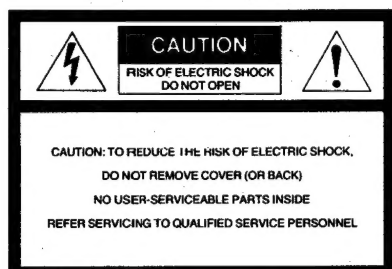


**Up to Eight-hour recording**

**Extended Time One Touch Recording (240 MIN)**

## ► PV-1230/PV-1222/PV-1225 Comparison Chart

FEATURES	PV-1230	PV-1222	PV-1225
STILL	SLP		
FRAME ADVANCE	SLP		
SLOW	SLP		
SEARCH	SLP (×9)		
PROGRAM	2 week/1 program		
ONE TOUCH RECORDING	4 hours		
TUNER	12 position		
CHNNEL	107 ch	82 ch	82 ch
WIRED REMOTE CONTROL	5 functions	1 function	1 function



This symbol warns the user that uninsulated voltage within the unit may have sufficient magnitude to cause electric shock. Therefore, it is dangerous to make any kind of contact with any inside part of this unit.



This symbol alerts the user that important literature concerning the operation and maintenance of this unit has been included. Therefore, it should be read carefully in order to avoid any problems.

# DESCRIPTION OF CONTROLS

## TOP and FRONT

### • RESET BUTTON

Pushing this button causes the Tape Counter to return to "0000". By beginning the recording at "0000", subsequent playback will be more convenient.

### • TIMER BUTTON

This button is used to put the VCR in Unattended Recording mode after programming functions have been completed. When this button is ON, "TR" appears on the Multi Function Display, and you will not be able to operate the unit manually.

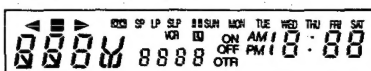
### • CHANNEL SELECTOR BUTTONS/INDICATOR LIGHTS

Select the channel (2~83, A~W, A-2, A-1) you wish to view or record by pushing any one of these 12 buttons.

### • CASSETTE HOLDER

### • PUSH BUTTON CONTROLS (See next page.)

### • MULTI FUNCTION DISPLAY (See next page.)



### • CHANNEL NUMBER HOLDER

Pull it out for changing channel tabs.

### • UHF/VHF/CATV TUNING CONTROLS (INNER DOOR)

Used to adjust each channel position for desired channel.

### • TAPE-SPEED SELECTOR (SP/LP/SLP)

Set this selector for the desired tape speed of a recording.

### • SLOW TRACKING CONTROL

If the slow-motion or still picture contains bands of noise, this control may require adjustment.

### • TRACKING CONTROL

Use this control during regular playback if the image is partially obscured by bands of noise.

### • TIMER CONTROLS

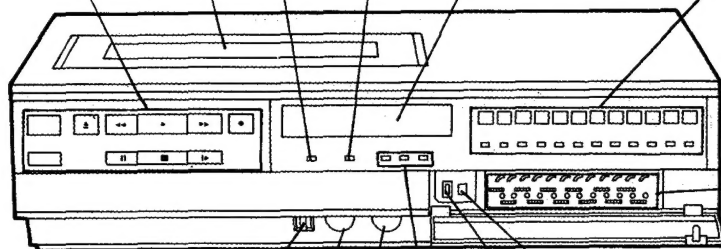
Used to set the Timer to make an Unattended Recording when you are away from home, busy or asleep.

### • AUTOMATIC FINE TUNING (AFT) SWITCH (INNER DOOR)

Under normal conditions, turn the AFT Switch "ON".

### • ONE TOUCH RECORD (O.T.R.) BUTTON (INNER DOOR)

One Touch Recording enables you to do impromptu recordings at any time. Just select the channel and push the ONE TOUCH RECORD Button for 30 minutes to 4 hours of recording.





## PUSH BUTTON CONTROLS

### • REWIND/SEARCH ◀◀ BUTTON

Push this button to rewind tapes. "REW" and "◀" appear on the Multi Function Display. During the playback mode, holding this button down will allow you to view the picture in reverse rapidly. "◀" flashes.

### • EJECT BUTTON

Push this button to insert or remove the cassette. "■" flashes on the Multi Function Display while the tape is being ejected.

### • POWER BUTTON

This button is used to turn the VCR on and off. When this button is pushed, counter appears on the Multi Function Display.

### • VCR/TV SELECTOR

VCR: To monitor video recordings or to view playback.

TV: To watch TV or to view another program while recording a different program.

When this is set to VCR, "VCR" appears on the Multi Function Display.

### • PAUSE/STILL BUTTON

Push this button to temporarily stop the tape movement in either the recording or playback mode. During playback a still picture is produced when the pause is used. Push again to release pause. When this button is pushed, "PLAY" and "■" appear on the Multi Function Display.

### • PLAY BUTTON

Push this button to play back recorded tapes. "PLAY" and "▶" appear on the Multi Function Display.

### • FAST FORWARD/SEARCH ▶▶ BUTTON

Push this button to move the tape forward rapidly. "FF" and "▶" appear on the Multi Function Display. During the playback mode, holding this button down will allow you to view the picture in the forward direction rapidly. "▶" flashes.

### • RECORD BUTTON

Recording is started by pushing this button and the PLAY Button at the same time. "REC" and "▶" appear on the Multi Function Display.

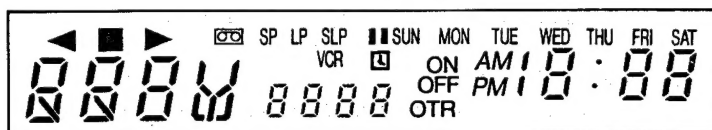
### • SLOW BUTTON

While viewing a still picture, push this button to advance the picture one frame at a time. "▶" flashes. During the playback mode, pushing this button will allow you to view a slow-motion picture. "SLOW" appears on the Multi Function Display.

### • STOP BUTTON

Push this button to stop the tape. "■" appears on the Multi Function Display.

## MULTI FUNCTION DISPLAY



### • DIGITAL CLOCK

Normally, the present time is displayed.

### • TAPE COUNTER

Tape counter number is displayed.

### • SPEED INDICATOR "SP" "LP" "SLP"

This shows the tape speed during recording and playback.

### • VCR/TV INDICATOR "VCR"

This indicator appears when the VCR/TV Selector is set to VCR.

### • FUNCTION INDICATOR "■■■■"

This shows the mode of VCR (EJECT, PLAY, REC, REW, FF, PAUSE, STILL, SEARCH, STOP, FRAME ADVANCE, SLOW).

### • DEW INDICATOR "DEW"

This indicator appears if excessive moisture condenses in the unit. If the DEW Indicator is ON, the unit will not operate. If this happens, leave the VCR ON and let it remain at room temperature until this indicator goes off.

### • TIMER INDICATOR "□"

When TIMER Button is set to ON, this indicator appears and you will not be able to operate the unit manually.

### • O.T.R. INDICATOR "OTR"

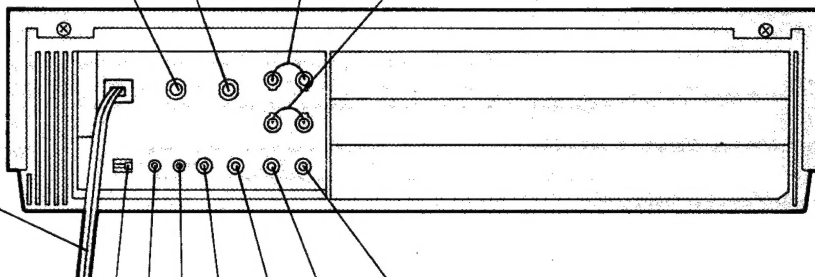
When OTR is set, this indicator appears.

### • CASSETTE-IN INDICATOR "C"

This indicator shows the condition of the cassette tape in the unit.

## REAR

- **VHF ANTENNA OUTPUT TERMINAL (TO TV SET)**  
Connect this terminal to the VHF antenna terminal on the TV.
- **VHF ANTENNA INPUT TERMINAL (FROM ANTENNA)**  
Connect the VHF antenna to this terminal.
- **UHF ANTENNA OUTPUT TERMINALS (TO TV SET)**  
Connect these terminals to the UHF antenna terminals on the TV.
- **UHF ANTENNA INPUT TERMINALS (FROM ANTENNA)**  
Connect the UHF antenna to these terminals.
- **AC POWER CORD**  
Connect to a 120 V 60 Hz AC outlet.
- **AUDIO INPUT CONNECTOR**  
For connection to a portable video camera or another VCR.
- **VIDEO INPUT CONNECTOR**  
For connection to another VCR or a portable video camera.
- **AUDIO OUTPUT CONNECTOR**  
For connection to a monitor TV, another VCR or an audio tape recorder.
- **VIDEO OUTPUT CONNECTOR**  
For connection to a monitor TV or another VCR.
- **CAMERA REMOTE JACK**  
For connection to the Remote Pause Jack of the optional camera.
- **REMOTE JACK**  
For connection to the Wired Remote Control.
- **RF CONVERTER CHANNEL SELECTOR**  
Set to channel 3 or 4, whichever is not used in your area.



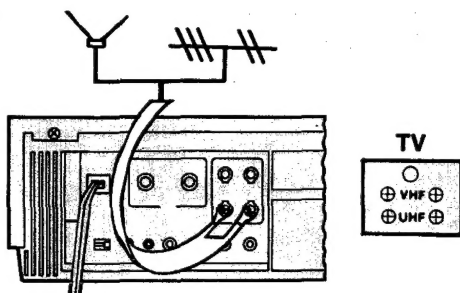
In some cases, the product may differ slightly from illustrations or photographs.  
Please be assured that this difference is not due to mistake but to ongoing product improvement.

# UHF AND CABLE CONNECTIONS

If you receive UHF TV broadcasts, connect TV antennas to the VCR and TV as shown below.

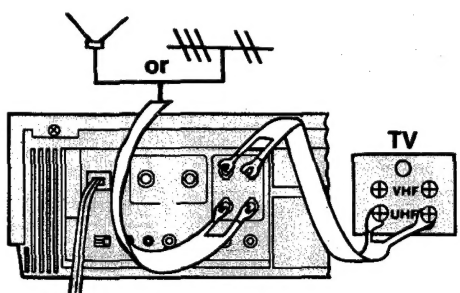
## UHF CONNECTION

### ① Indoor or outdoor UHF antenna



- Remove the UHF antenna twin lead wires from the back of your TV, and attach these wires to the UHF IN terminals of the VCR.

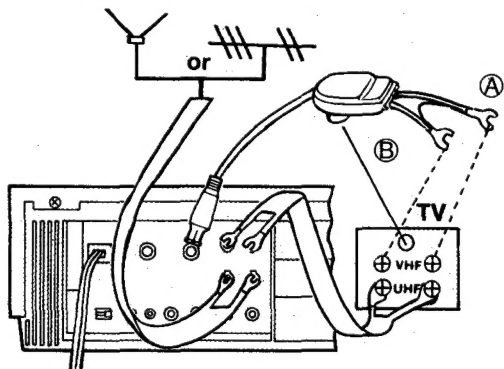
### ②



- Attach the Twin Lead (flat) Cable (supplied) to the UHF OUT terminals of the VCR.
- Attach the other end to the UHF terminals of the TV.

If you receive only UHF Channels, you must also add one of the following two connections ③ or ④ between your VCR and TV. This connection is necessary to view tapes in playback and to use your TV as a monitor.

- If you have only screw type VHF terminals on your TV, use connection ③. If using connection ③, set the switch of the VHF Connecting Cable to lower (300  $\Omega$ ) position.
- If you have a VHF terminal on your TV, use connection ④. If using connection ④, set the switch of the VHF Connecting Cable to upper (75  $\Omega$ ) position.

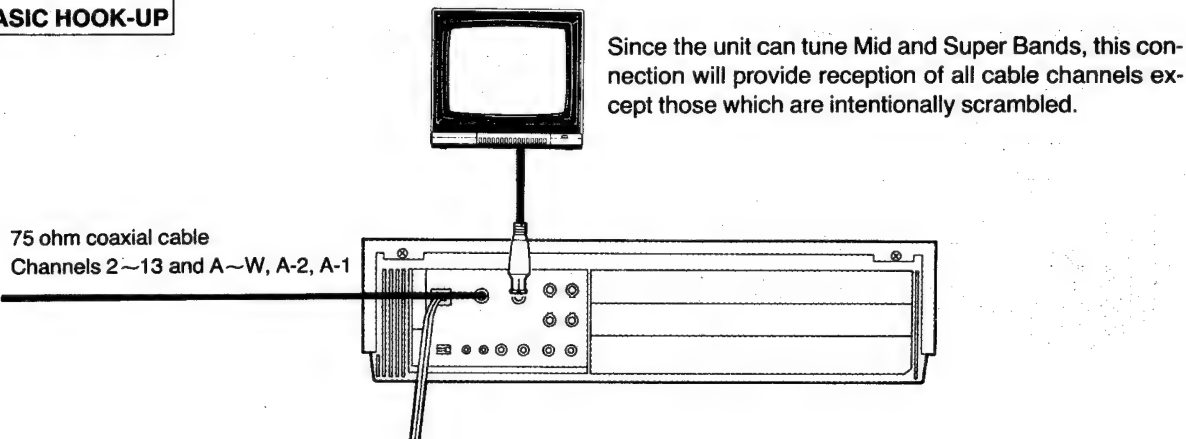


- Attach the VHF Connecting Cable (supplied) to the VHF OUT terminal of the VCR.
- Attach the other end of the cable to the VHF terminal of the TV (connection ③) or the VHF antenna terminals of the TV (connection ④).

## CABLE-VCR-TV (FOR CATV/PAY CHANNELS RECORDING/PLAYBACK)

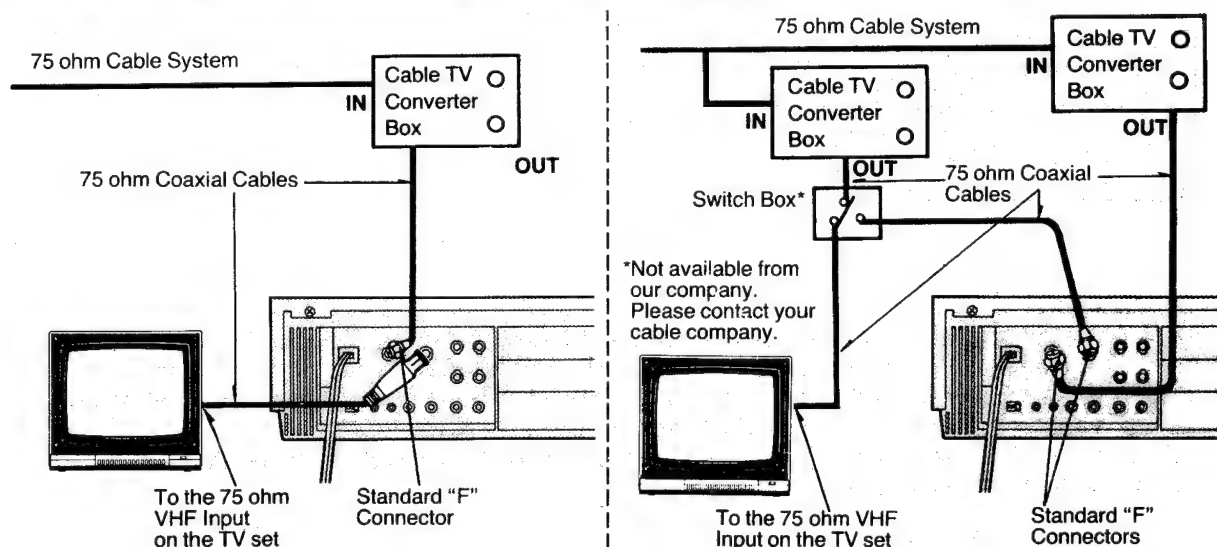
The unit has an extended range, and can tune the Mid-Band and Super-Band cable channels. (Channels A~W, A-2, A-1). Also, the unit can tune to any of the 70 UHF channels (14-83). Refer to VCR FINE TUNING.

### BASIC HOOK-UP



However, if you subscribe to a special channel which is scrambled-you probably have a descrambler box for proper reception. The Unit by itself cannot properly receive a scrambled program since it does not contain a descrambler. In order for the Unit to properly receive a scrambled program, your existing descrambler must be used. There are two commonly used methods of connection in this case.

### TYPICAL CABLE SYSTEM HOOK-UPS WITH CABLE CONVERTER/DESCRAMBLER BOXES



The above cable hook-up allows VCR-TV functions except for viewing one channel while recording another.

The above cable hook-up allows VCR-TV functions, including viewing one channel while recording another, but if requires two cable TV Converter Boxes and one Switch Box.

Since the PV-1230 has an extended range of tuning, tuning-programming of non-scrambled Mid-Band and Super-Band TV programs is possible. When a cable converter or descrambler box is connected to the unit, all Unattended Recording functions will continue to operate with the exception of changing channels automatically. Channel selection will have to be performed with the cable converter. Unattended Recording is therefore limited to one channel at any given time.

# GLOSSARY OF TERMS

## **ACC**

Automatic Color Control used to maintain an overall constant color signal level in the color circuits.

## **ACK**

Automatic Color Killer.

## **Adjacent Track**

This is the name of the video track to the immediate left or right of the track of concern.

## **AFC**

Automatic Frequency Control used to phase-lock the color circuits to either the recording or playback color signal, in order to achieve a stable color signal.

## **AFT**

Automatic Fine Tuning...This is a special circuit found in most recent TV sets which makes the local oscillator of the TV tuner follow the channel of concern in order to produce a stable IF frequency. In other words, if for any reason the TV station being received changes frequency, the AFT circuit will automatically compensate so that no interference will be seen on the screen, i.e., no manual fine tuning is necessary.

## **AGC**

Automatic Gain Control used to maintain an overall constant picture level in the luminance circuits.

## **APC**

Automatic Phase Control used to help phase lock the color circuits to either the recording or playback color signal in order to achieve a stable color signal.

## **Azimuth**

A term used to describe the left to right tilt of the gap of a recording head, if it could be viewed straight on.

## **Balanced Modulator**

A circuit so designed to give as an output the frequency sum or frequency difference of its two input signals. Any special characteristics of one of the input signals will be present in the output signal.

## **Beats**

A term used to describe the unwanted signals produced when two original signals are allowed to be mixed together.

## **Bipolar PG**

Pulse Generator signals that have both positive and negative excursions.

## **Burst**

A short time occurrence (8 to 10 cycles) of the 3.58MHz subcarrier signal, appearing right after horizontal sync but centered on the blanking portion of the video waveform. Burst is used to keep the color oscillator of a TV receiver locked to the broadcast station.

## **B/W**

Abbreviation for Black and White.

## **C**

Capacitor.

## **C Signal**

The color portion of a video signal.

## **Capstan**

A small rotating metal dowel which drives the recording tape to assure positive tape movement.

## **Chroma**

The color portion of a video signal.

## **Chrominance**

The color portion of a video signal.

## **Clamp**

The process of giving an AC signal a specific DC level.

## **Control Signal**

A special signal recorded onto the video tape which is used during playback as a reference for the servo circuits.

## **Converted Subcarrier**

This is the process of frequency shifting the color 3.58MHz subcarrier and its sidebands down to 629kHz.

## **Crosstalk**

The name given to the unwanted signals obtained when a video head picks up information from an adjacent track.

## **CUE**

To scan the playback picture at a faster than normal speed in the Forward direction.

## **D**

Diode.

## **DL**

Delay Line.

## **Dark Clip**

After emphasis, the negative going spikes (undershoot) of a video signal may be too large in amplitude for safe FM modulation. A dark clip circuit is used to cut off these spikes at an adjustable level.

## **DDC**

Direct Drive Cylinder...as used in VHS, this means that the video heads are driven by a self-contained brushless DC motor using no belts or gears. DD cylinders produce pictures with better stability.

## **Delta Factor ( $\Delta f$ )**

A term used to indicate that a playback signal off the video tape has some jitter or "wow and flutter".  $\Delta f$ , or "a change in frequency" means that the color signal off the tape is not a stable frequency of 629kHz, but rather a signal whose frequency at any instant is some small amount above or below 629kHz.

## **Deviation**

A term used to describe how far the FM carrier swings when it is modulated. In VHS the upper limit is 4.4MHz.

## **Dew Detector**

A variable resistor whose resistance value depends upon the ambient humidity.

## **Dihedral**

A term used to describe the relative position between the two video heads as they are mounted in the head cylinder. Perfect dihedral means that the tips of the heads are exactly 180° apart.

## **Dropout**

A momentary absence of FM or color signal off the tape, whether due to uneven oxide or a coating of dust on the tape or video heads.



## Duty Cycle

In describing a rectangular waveform, the "duty" refers to the percentage of off time and on time for one complete cycle. 50—50 means that there are equal periods of off time and on time for one cycle and this would be a square wave.

## E-E

Electronics to Electronics...this is the picture viewed on the TV set when a recording is being made. This picture goes through some but not all of the circuits of the recorder and is used to test the operation of said circuits.

## EQ

Shortened form of "Equalization", used in the audio circuits.

## Emphasis

The process of boosting the level of the high frequency portions of the video signal.

## FG

Frequency Generator used in the servo circuits.

## FL

Filter.

## FM Signal

The luminance portion of the video signal is used to control the frequency of astable multivibrator. The output of this multivibrator is a frequency modulated (FM) signal shifting from 3.4MHz to 4.4MHz (plus sidebands).

## Field

One half of a television picture. A field consists of 262.5 horizontal scanning lines across the picture tube. Two fields are necessary to complete a fully scanned TV picture (frame). First, one field is "sprayed" on the picture tube, starting at the top of the tube with Line 1, and ending at the bottom with Line 262.5. Then, the next field begins at the top of the tube again with Line 262.5 and ends at the bottom with Line 525. The lines of the second field lie in-between the lines of the first field. This property of falling in-between lines is called "interlacing". The two sweeps of the picture tube, or two fields make up one complete TV picture of "frame". Frame repetition is 30Hz, therefore field repetition is 60Hz.

## Flagwaving

This is the term used to describe a TV set's ability to accept unstable playback pictures from a video tape recorder. All home VTR's have some degree of playback instability. A TV set with a long horizontal AFC time constant may not recover from the VTR's instability before the active picture is being scanned. This can cause a bending or flapping from side to side of the top inch or so of the screen. This movement is called "flagwaving".

## Frame

One complete TV picture. See "Field".

## Gate

A circuit which will deliver an output only when a specific combination of its inputs are present. For use in analog or digital applications.

## Guard Band

This is the space between video tracks on the video tape in the SP mode. Guard bands contain no information.

## Hall Effect IC

An external magnetic field causes current to flow in this type of device.

## HD

Horizontal Drive signal.

## Head Cylinder

A cylindrical piece of metal which houses the video heads. The tips of the heads protrude slightly from the surface of the cylinder so that they may scan the tape as the cylinder spins.

## Head Switching

The action of turning off during playback, the video head which is not in contact with the video tape. A particular video head will be turned off 30 times per second. This is done so that the head which is not scanning the tape, and therefore not delivering a good signal, cannot contribute any noise to the playback signal.

## Head Switching Pulse

The signal which is applied to the Head Amplifier to perform head switching. This is a square wave at 30Hz, with a 50—50 duty cycle.

## Helical

A word used to describe a general type of VTR in which the tape wraps around the video head cylinder in the shape of a 3-dimensional spiral, or "helix". The video tracks are recorded as a series of slanted lines.

## IC

Integrated Circuit.

## Interchangeability

A term used to describe how well a particular VTR will play back a tape recorded on another VTR of the same type. Good interchangeability indicates good playback.

## Interlacing

The property of the scan lines of two television fields to lie in-between each other. See "Field".

## Interleaving

A term used to indicate that the harmonics of the chrominance signal lie in-between the harmonics of the luminance portion of the video signal as it is viewed on a spectrum analyzer. This means that the color information of a video signal does not interfere with, although it is broadcast at the same time as, the luminance information.

Also, signals which have this interleaving property are not readily seen on a TV screen, because of their virtual cancellation characteristics.

Interleaving signals (fi) must have the following frequency relationship:

$$f_i = \left( \frac{2n+1}{2} \right) \times f_H \quad (n = 0, 1, 2, 3, 4, \dots)$$

$$f_H = 15,734 \text{ Hz (H sync frequency)}$$

## Jitter

The name of the effect on the playback picture if a VTR has too much "wow and flutter". The picture appears to have a rapid shaking movement.

## L

Coil.

## Luminance

This is the portion of video signal which contains the sync and B/W information.

## MMV

Monostable Multi-Vibrator...Usually an IC device which gives a logic high or low output with a variable duration upon receipt of an input pulse or transition.

**Non-Linear Emphasis**

This is similar to regular emphasis with the difference that small level high frequency portions of the signal are given more of a boost than higher level high frequency portions.

**NTSC**

The National Television Systems Committee. These four letters identify the United States color television standard.

**O.T.R.**

One Touch Recording (O.T.R.) enables you to do impromptu timer recordings at any time. When you have to go out for urgent matters or you are going to sleep, this function is very useful. Just select the channel and push the O.T.R. Button for 30 minutes to 2 hours of recordings. After recording, the VCR will be turned off automatically.

**PG**

Pulse Generator used in the servo circuits.

**Q**

A term used to describe the graphic response of a filter or tuned amplifier.

**R**

Resistor.

**Review**

To scan the playback picture at a faster than normal speed in the Reverse direction.

**RF**

Radio Frequencies.

**Rotary Chroma**

The name of the process used in VHS to change the phase of the chrominance signal at a rate of 15,734 (same as H sync frequency) times per second.

**Rotary Transformer**

A device used to magnetically couple RF signals to and from the spinning video heads, thus eliminating the need for brushes.

**Sample and Hold**

A process used in comparator circuits by which the value of a particular signal is measured at a specific moment in time...then this value is stored for later use.

**Search**

To scan the playback picture at a faster than normal speed in either the forward or reverse direction.

**Servo**

Short for Servo mechanism. This is an electro-mechanical device whose mechanical operation (for instance motor speed) constantly being measured and regulated so that it closely matches or follows an external reference.

**Skew**

Another way of saying Tension Error. Skew is actually the change of size or shape of the video tracks on the tape from the time of recording to the time of playback. This can occur as a result of poor tension regulation by the VTR, or by ambient conditions which affect the tape.

**Subcarrier**

The name of the 3.58MHz continuous wave signal used to carry color information.

**SS**

Slow and Still.

**T**

Transformer.

**TP**

Test Point.

**TR**

Transistor.

**Tension Error**

See "Skew".

**Time Base Stability**

A term used to describe how closely the playback video signal from a VTR matches an external reference video signal...in regard to sync timing rather than picture content.

**Tracking**

This is the action of the spinning video heads during playback when they accurately track across the video RF information laid down during recording. Good tracking indicates that the heads are positioning themselves correctly, and are picking up a strong RF signal. Poor tracking indicates that the heads are off track, and picking up low level RF signal or noise.

**VCO**

Voltage Controlled Oscillator...An oscillator whose frequency of oscillation is governed by an external voltage.

**Video Head**

This is the electro-magnet used to develop magnetic flux which will put RF information on the tape. In VHS, two video heads are mounted in a rotating cylinder around which the video tape is wrapped. As the cylinder spins, each video head is allowed to alternately scan the tape.

**Video Track**

The name of the RF information laid down during recording, as a particular video head scans across the tape.

**VHS**

Video Home System.

**VTR**

Video Tape Recorder.

**VV**

Video to Video...or...the actual playback picture produced from a tape during playback.

**VXO**

Voltage Controlled Crystal Oscillator...Similar to VCO except that a quartz crystal is used as a reference which can be varied.

**White Clip**

After emphasis, the positive going spikes (overshoot) of the video signal may be too large for safe FM modulation. A white clip circuit is used to cut off these spikes at an adjustable level.

**XTAL**

Abbreviation for crystal.

**Y Signal**

The B/W portion of a video signal containing B/W information and sync.

# Service Manual

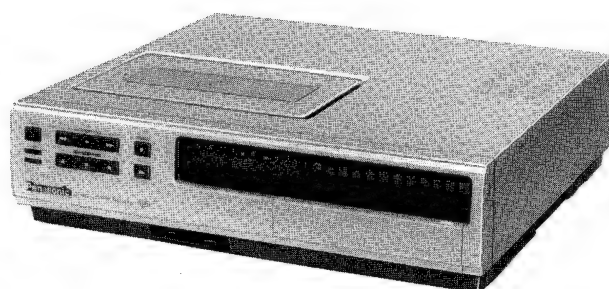
**Vol. 2**

Video Cassette Recorder

**Panasonic**  
 Omnivision **VHS**
**PV-1220**

## Mechanical Adjustment Procedures

## Electrical Adjustment Procedures



### SPECIFICATIONS

Power Source: 120 V AC  $\pm 10\%$ , 60 Hz  $\pm 0.5\%$   
 Power Consumption: Approx. 21 watts  
 Television System: EIA Standard (525 lines, 60 fields)  
 NTSC color signal

#### Video Recording

System: 2 rotary heads, helical scanning system  
 Luminance: FM azimuth recording  
 Color signal: Converted subcarrier phase shift recording

Audio Track: 1 track

Tape Format: Tape width 1/2" (12.7 mm), high density tape

Tape Speed: SP mode: 1-5/16 i.p.s. (33.35 mm/s)  
 LP mode: 21/32 i.p.s. (16.67 mm/s)  
 SLP mode: 7/16 i.p.s. (11.12 mm/s)

Record/Playback Time: 8 HRS. with 160 min. type tape used in SLP mode

FF/REW Time: Less than 6 min. with 120 min. type tape

Heads: Video: 2 rotary heads  
 Audio/Control: 1 stationary head  
 Erase: 1 full track erase  
 1 audio track erase

Input Level: Video: VIDEO IN Jack (RCA type)  
 1.0 Vp-p, 75  $\Omega$  unbalanced  
 Audio: AUDIO IN Jack (RCA type)  
 -20 dB, 100 k $\Omega$  unbalanced

TV Tuners: VHF Input: VHF Ch2-Ch13,  
 75  $\Omega$  unbalanced  
 UHF Input: Ch14-Ch83,  
 300  $\Omega$  balanced

Output Level: Video: VIDEO OUT Jack (RCA type)  
 1.0 Vp-p, 75  $\Omega$  unbalanced  
 Audio: AUDIO OUT Jack (RCA type)  
 -6 dB, 600  $\Omega$  unbalanced

RF Modulated: Ch3/Ch4 switchable,  
 72 dB $\mu$ , (Open Voltage)  
 75  $\Omega$  unbalanced

#### Video Horizontal

Resolution: Color: more than 230 lines  
 B/W: more than 230 lines

#### Audio Frequency

Response: SP mode: 100 Hz ~ 8 kHz  
 (10 dB down) LP mode: 100 Hz ~ 6 kHz  
 SLP mode: 150 Hz ~ 5 kHz

Signal-to-Noise Ratio: Video: SP mode: better than 40 dB  
 LP mode: better than 40 dB  
 SLP mode: better than 40 dB  
 (Rohde & Schwarz noise meter)  
 Audio: SP mode: better than 42 dB  
 LP mode: better than 40 dB  
 SLP mode: better than 40 dB

#### Operation

Temperature: 41°F—104°F (5°C—40°C)  
 Operating Humidity: 10%—75%  
 Weight: 17.6 lbs. (8.0 kg)  
 Dimensions: 16-15/16" (W)  $\times$  14-3/8" (D)  $\times$  4-1/2" (H)  
 (430 mm  $\times$  365 mm  $\times$  115 mm)

#### Accessories Supplied:

- Remote control unit
- VHF matching box 75  $\Omega$ —300  $\Omega$  transformer
- 300  $\Omega$ —75  $\Omega$  transformer
- Coaxial cable with one-touch type F Connector
- Twin-lead cable

#### Available Tapes:

1/2" VHS video cassette tapes  
 NV-T160 Approx. 1073 ft. (327 m), 160,  
 320, or 480 min  
 NV-T120 Approx. 810 ft. (247 m), 120, 240,  
 or 360 min  
 NV-T60 Approx. 417 ft. (127 m), 60, 120,  
 or 180 min.

Weight and dimensions shown are approximate. Specifications are subject to change without notice.

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## IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are shaded on the schematic diagram and on the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire, or other hazards. Do not modify the original design without permission of manufacturer.

# MECHANICAL ADJUSTMENT PROCEDURES

## DISASSEMBLY OF CABINET PARTS

### 1. DISASSEMBLY FLOWCHART

This flowchart indicates disassembly steps of the cabinet parts and the Bottom PC Boards in order to find the item(s) necessary for servicing. When reassembling, perform the step(s) in the reverse order. Bottom Plate can be removed separate.

#### Notes:

1. When removing the front panel, work with care so as not to break the locking portions of the panel.
2. Adjustments are required when the Cassette Guide and Cassette Up Unit are replaced.

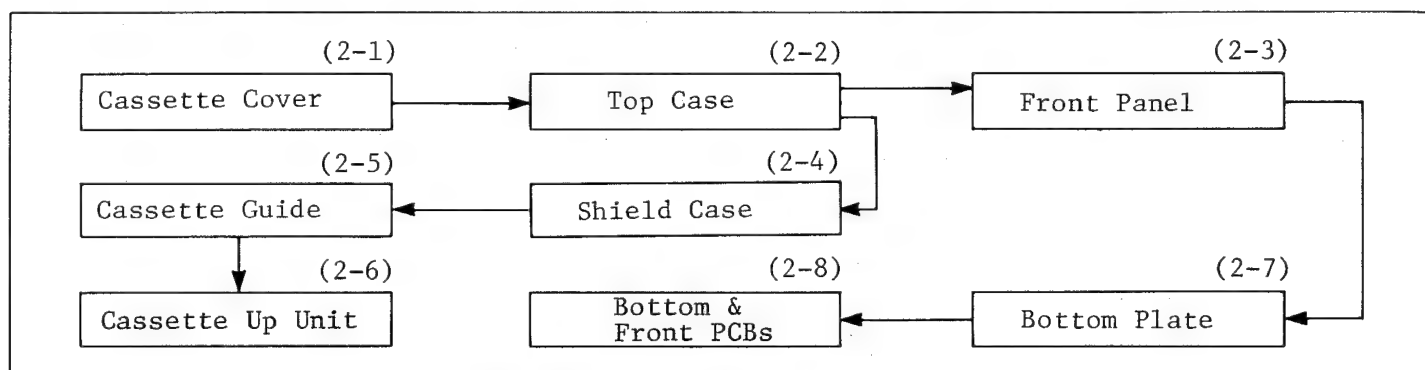


Fig. M1 Disassembly Flow Chart

### 2. DETAILED DISASSEMBLY METHOD

#### 2-1. Removal of the Cassette Cover

Press the eject button to raise the cassette up unit, remove 2 screws (A) and move the cassette cover upwards to unlock the locking tabs. Then remove the cassette cover.

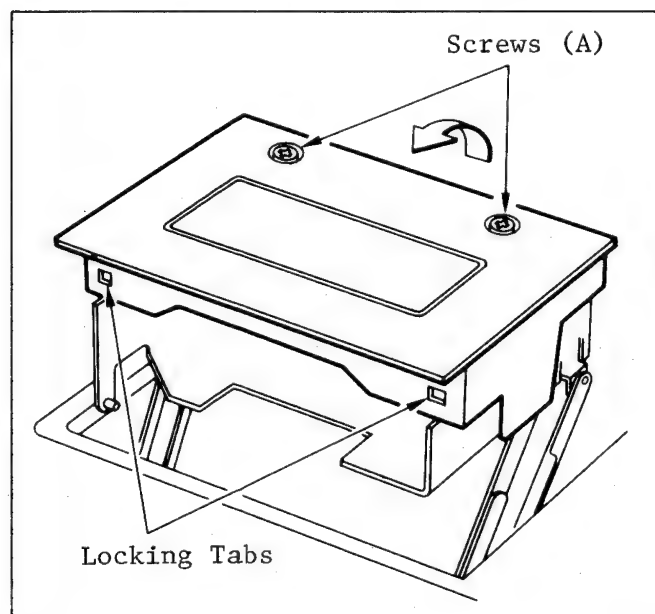


Fig. M2 Removal of Cassette Cover

#### 2-2. Removal of the Top Case

Lower the cassette up unit, remove 2 screws (B). Then pull the top case towards the back and then carefully lift the front portion to remove.

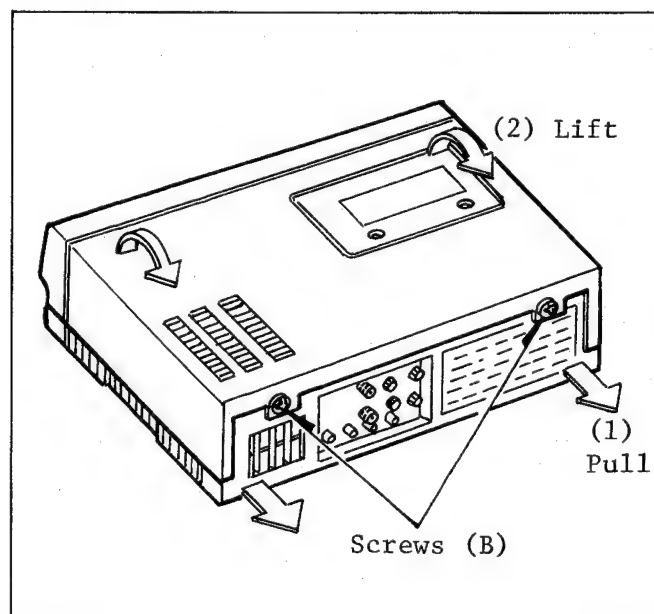


Fig. M3 Removal of Top Case



### 2-3. Removal of the Front Panel

Release 3 locking tabs. Then hold both right and left top portions of the panel and turn it towards the front of deck to remove.

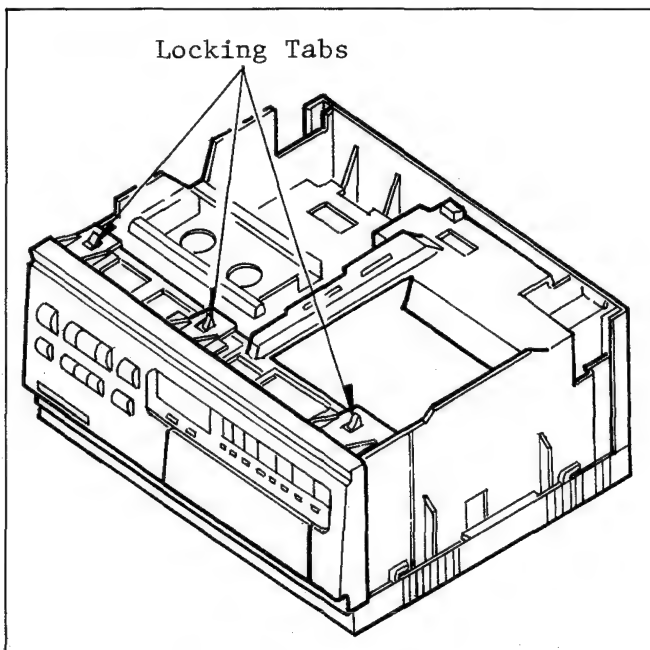


Fig. M4 Removal of Front Panel

### 2-4. Removal of the Shield Case

Remove 4 screws (C) and carefully lift the Shield Case.

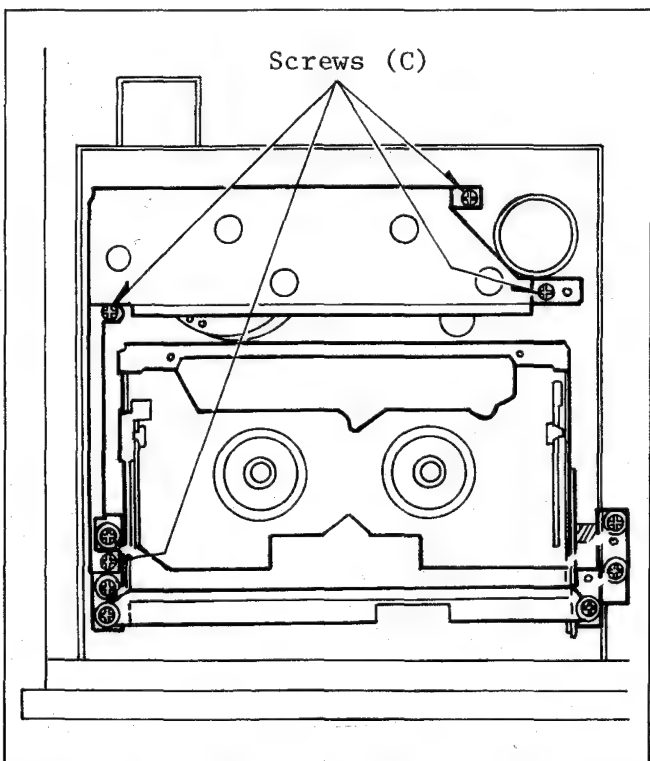


Fig. M5 Removal of Shield Case

### 2-5. Removal of the Cassette Guide

Remove 2 screws (D) and the Cassette Guide.

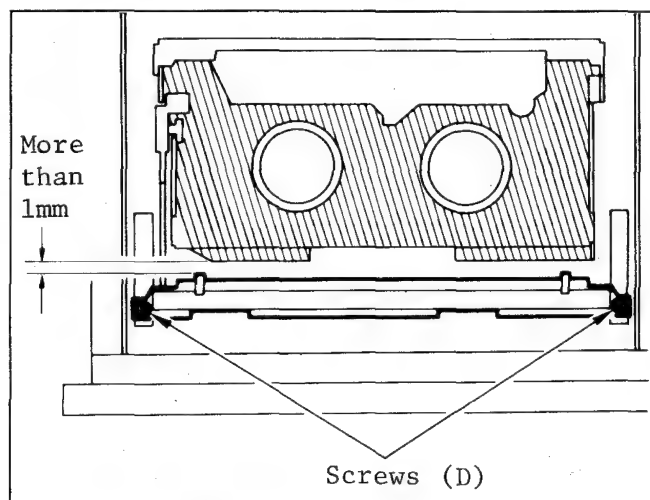


Fig. M6 Removal of Cassette Guide

#### Note:

When the cassette guide only is removed, it should be reinstalled after the cassette up unit is installed because an adjustment is required. When reinstalling, insert the cassette tape and ensure that the clearance between cassette and projections on the cassette guide is more than 1 mm.

### 2-6. Removal of the Cassette Up Unit

Raise the cassette up holder, remove 2 screws (E) on each side.

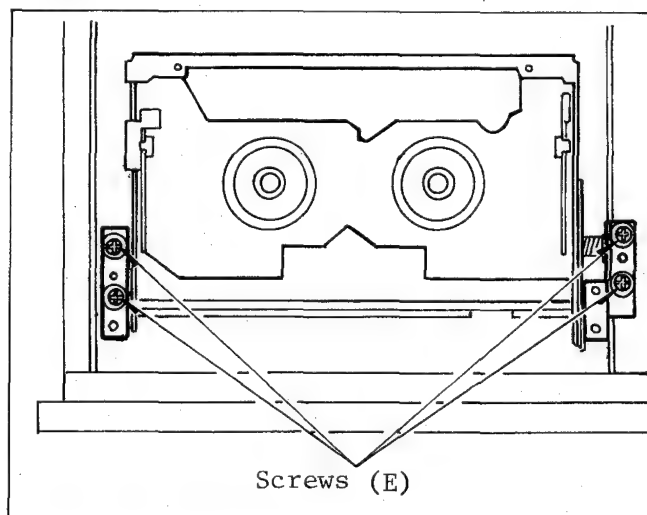


Fig. M7 Removal of Cassette Up Holder

#### Note:

An adjustment is required when re-installing. Refer to "ADJUSTMENT OF CASSETTE UP UNIT" section.

## 2-7. Removal of the Bottom Plate

Place the deck so that the left side faces down, hold the deck with your hand and remove 6 screws (F).

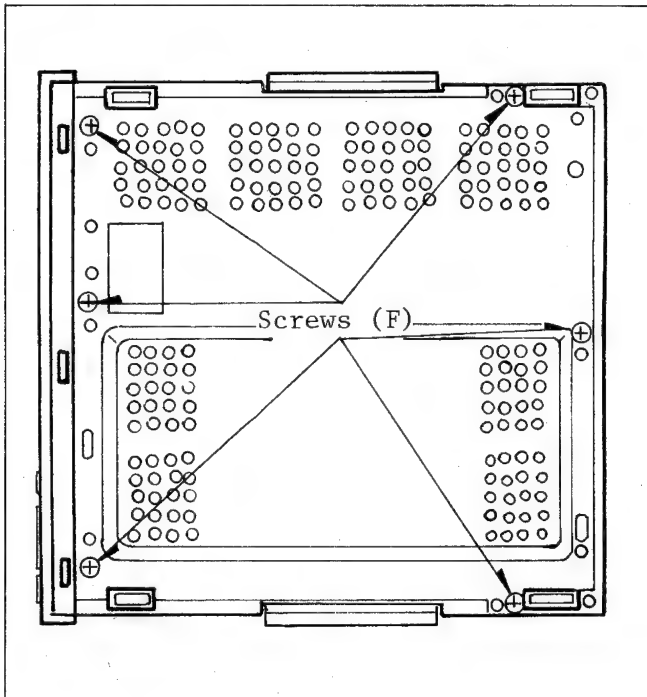


Fig. M8 Removal of Bottom Plate

## 2-8. Opening of the Bottom & Front PC Boards

Place the deck so that the left side faces down, hold the deck with your hand and remove 2 red screws (G).

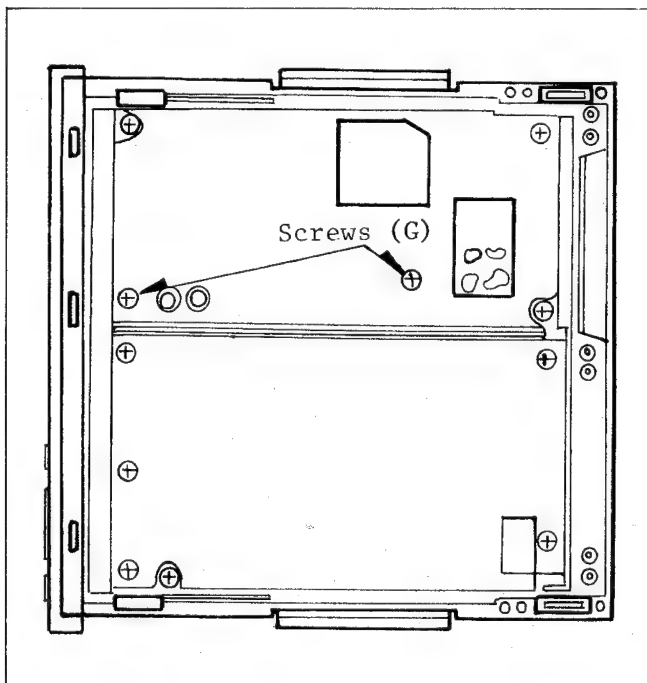


Fig. M9 Opening of Bottom & Front PCBs-(1)

Next release the 6 locking tabs of front P.C. Boards.

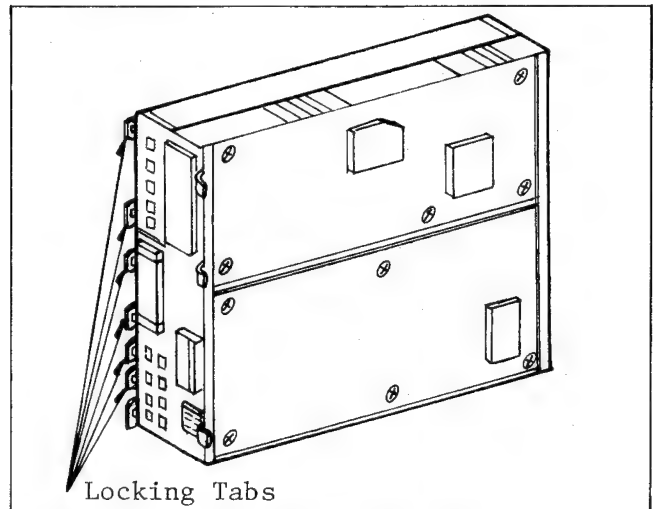


Fig. M10 Opening of Bottom & Front PCBs-(2)

Then open the Bottom & Front P.C. Boards.

## PROCEDURE FOR CLEANING OF UPPER CYLINDER UNIT

1. Position the video head to permit access for cleaning and hold the upper cylinder to keep it from turning while cleaning.
2. Gently rub the video head in direction of tape travel with Head Cleaning Stick (VFK27) moistened with freon solvent.
3. Repeat for the other video head.

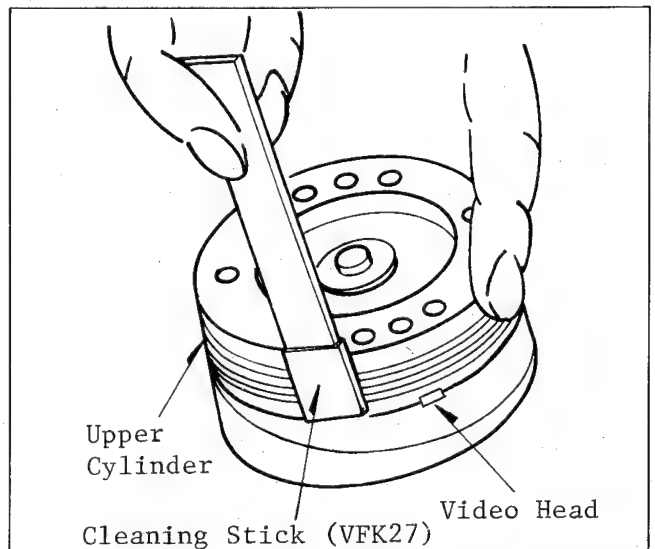


Fig. M11 Head Cleaning

## Notes:

1. Do not rub vertically.
2. Do not apply any pressure to head. If contaminant is not easily removed, continued gentle wiping will usually remove the substance.

## ADJUSTMENT PROCEDURES

### 1. REPLACEMENT OF UPPER CYLINDER UNIT

Work with extreme care when removing or replacing the upper cylinder unit. Do not touch video heads during servicing.

1. Unsolder the 4 wires which are color coded to matching wires on the head relay board.
2. Remove the 2 screws and gently lift the upper cylinder unit from the shaft.

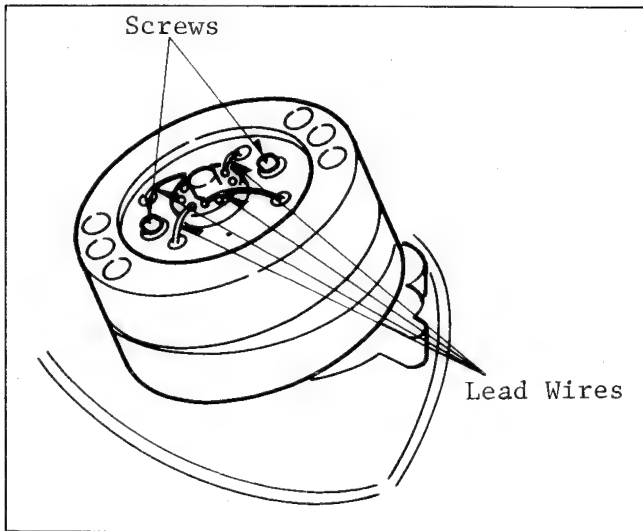


Fig. M12 Replacement of Upper Cylinder Unit-(1)

3. Before reinstalling a new unit, clean the D.D. cylinder shaft and the surface that it engages on the upper cylinder with a soft cloth dampened with freon liquid.

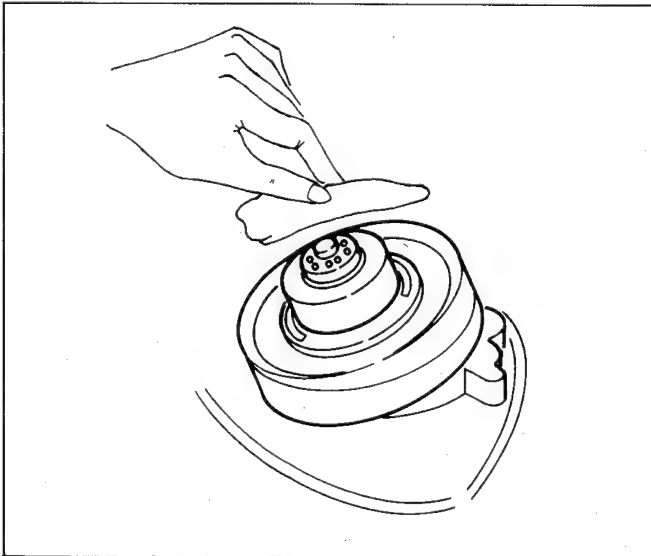


Fig. M13 Replacement of Upper Cylinder Unit -(2)

4. Install new unit according to the color code of the head relay board. Tighten the 2 screws and resolder the 4 wires to the head relay board.

#### Note:

Upon completion of replacement, confirm performance. And if required, perform "TAPE INTERCHANGEABILITY ADJUSTMENT".

### 2. REPLACEMENT OF D.D. CYLINDER UNIT

Work with extreme care when removing or replacing the D.D. cylinder unit. Do not touch video heads during servicing.

1. Remove the screw and shield case.
2. Disconnect 2 connectors (P2001 and P3001) from the D.D. cylinder unit.
3. Remove screw (A) and discharge angle.
4. Remove the D.D. cylinder unit by removing 3 screws (B).

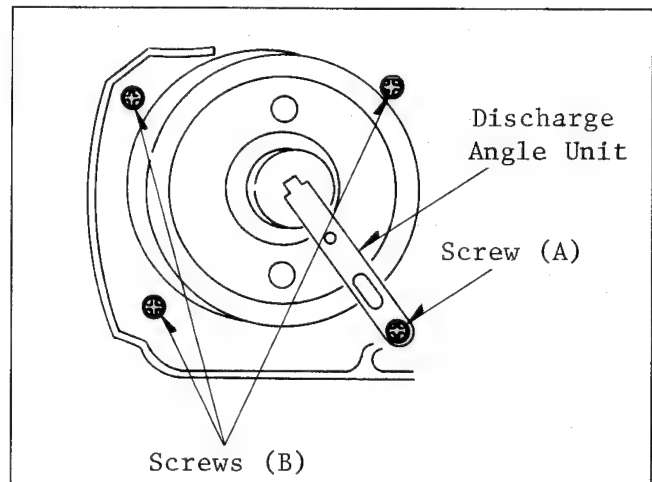


Fig. M14 Replacement of D.D. Cylinder Unit -(1)

#### Note:

Since there is very little clearance between D.D. cylinder unit and chassis, remove the D.D. cylinder unit gently and carefully.

5. Remove the upper cylinder unit from the D.D. cylinder and reinstall it on new one. To perform this step, refer to "REPLACEMENT OF UPPER CYLINDER UNIT" section.
6. Reinstall the new D.D. cylinder unit, restore the wires and connect 2 connectors, (P3001 and P2001).

**Notes:**

1. When reinstalling the New D.D. Cylinder Unit, fit the New D.D. Cylinder Unit to the chassis by turning it counterclockwise.

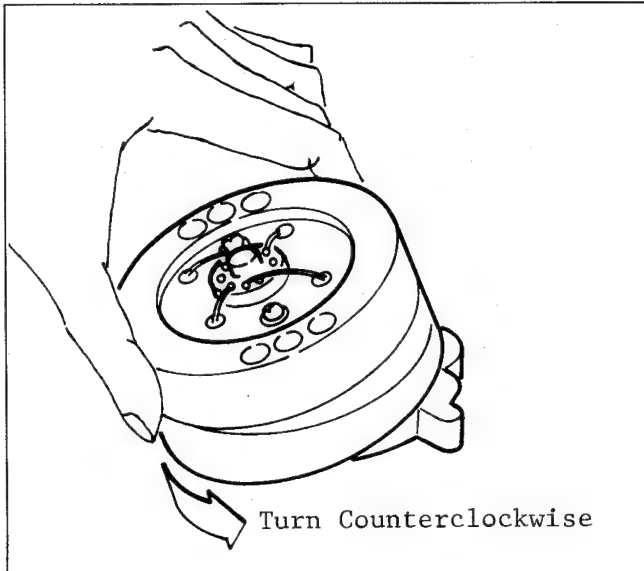


Fig. M15 Replacement of D.D. Cylinder Unit-(2)

2. Upon completion of replacement, confirm performance.  
If any further maintenance is required, perform "TAPE INTERCHANGEABILITY ADJUSTMENT".

**3. CONFIRMATION OF DISCHARGE ANGLE UNIT INSTALLATION POSITION**

Check to see if the discharge angle unit is correctly set in a position within 1 mm to the UP side from the center of the cylinder shaft as show in Fig. M16.

**Note:**

Never install the discharge angle unit to any position to the down side from the center of the cylinder shaft, but always within a maximum of 1 mm to the UP side of the center of this shaft.

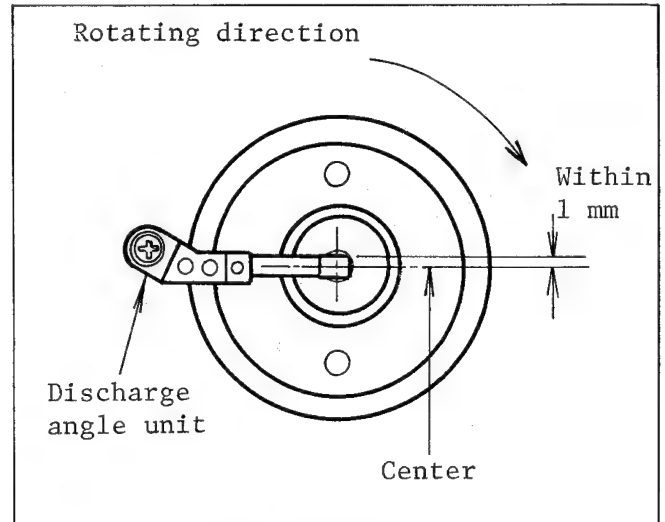


Fig. M16 Confirmation of Discharge Angle Unit Position

**4. POSITION ADJUSTMENT OF CASSETTE GUIDE PIN**

This adjustment is required only when the cassette guide pin has been replaced or it's mounting screw has been loosened.

**\* Equipment Required:**

Guide Pin Fixture ..... (VFKS0006)

1. Remove the Cassette Cover, Top Case, Cassette Up Unit and the Shield Case.
2. Move the Pressure Roller back with your finger and slightly loosen screw (A).

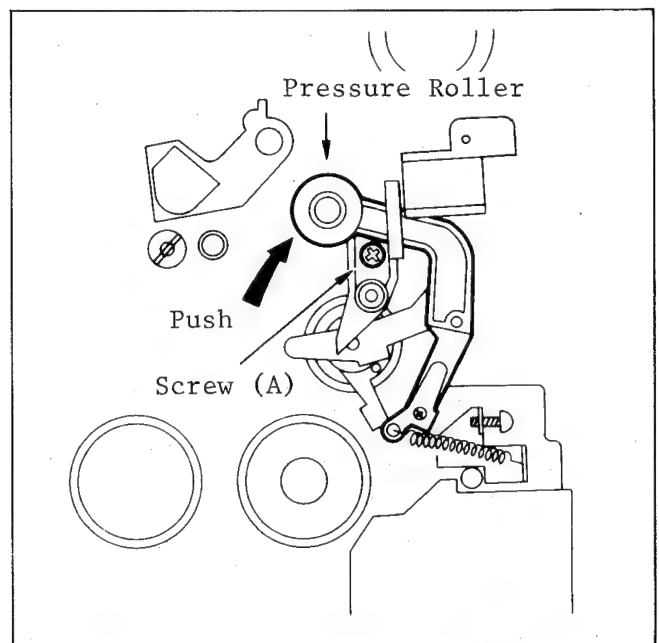


Fig. M17 Adj. of Cassette Guide Pin-(1)

3. Install the guide pin fixture and move it so that the capstan shaft fits snugly in the notch of the fixture and adjust the guide pin as shown below. Then tighten screw (A).

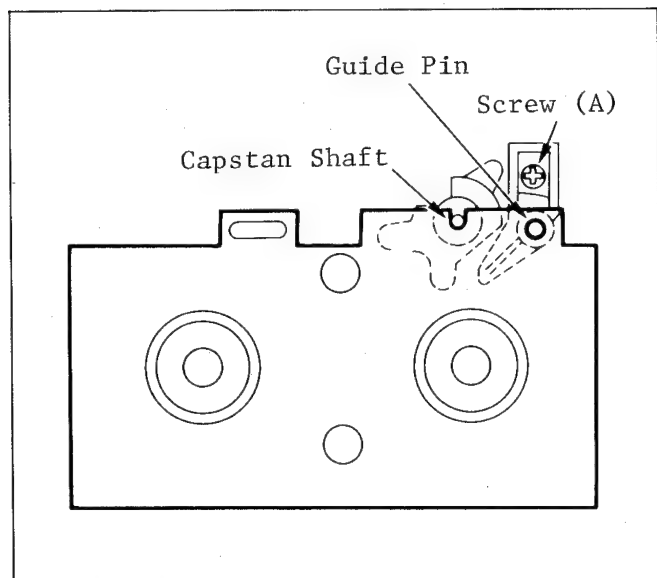


Fig. M18 Adj. of Cassette Guide Pin-(2)

#### 5. POSITION ADJUSTMENT OF PRESSURE ROLLER

A: Specification:  $1.2 \begin{smallmatrix} +0.3 \\ -0.5 \end{smallmatrix} \text{mm}$

1. Remove the Cassette Up Unit. Connect a jumper from Q6014 ⑥ to GND, push the Lock Lever down, push the safety switch, PLAY button and RECORD button to simulate the REC mode.

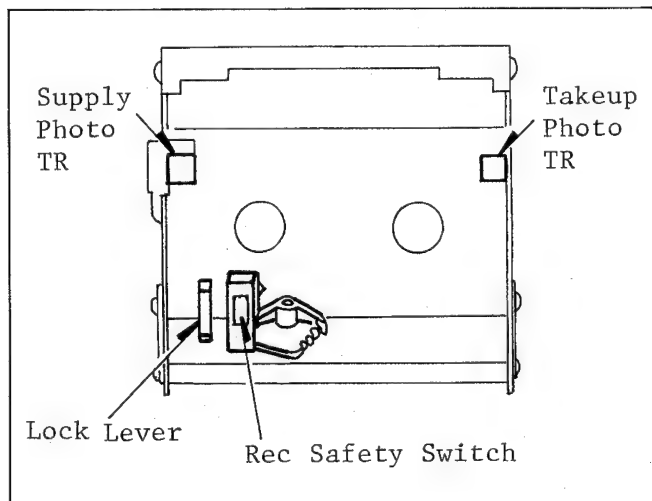


Fig. M19 Simulation of REC-PAUSE

2. Push the PAUSE button to simulate the REC-PAUSE mode.
3. Confirm that the clearance between the capstan shaft and pressure roller is within the specification.
4. If it is out of spec., adjust it by turning screw (A) to obtain the specified clearance.

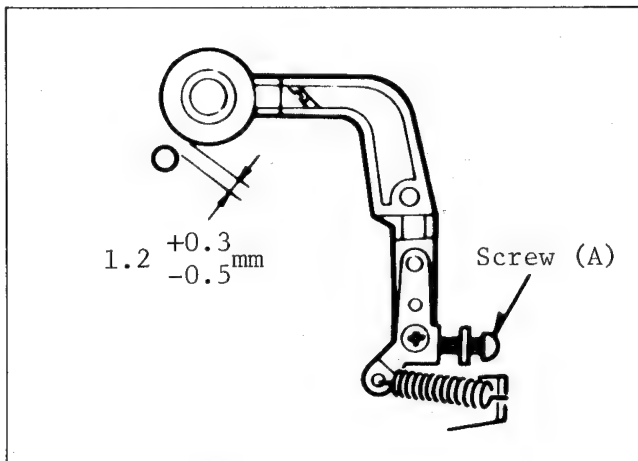


Fig. M20 Spec. of Clearance

Note:

Upon completion of the adjustment, remove jumper.

#### B: Adjustment of Oil Seal

Specification:  $0.8 \begin{smallmatrix} +0.1 \\ -0 \end{smallmatrix} \text{mm}$

Set the distance between the Capstan Holder Unit and Oil Seal to the specified clearance.

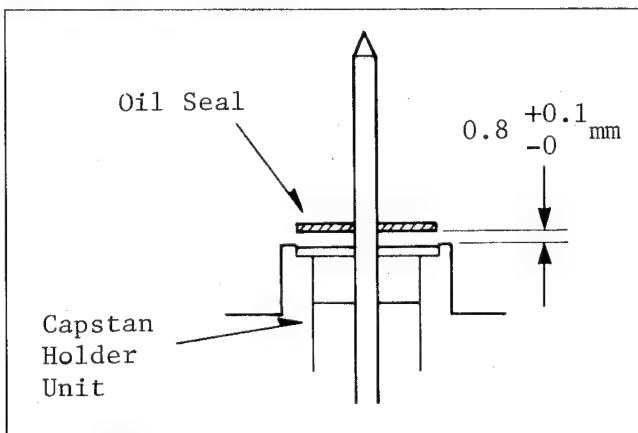


Fig. M21 Spec. of Clearance

#### 6. CONFIRMATION OF TAPE SPEED

\* Equipment Required:

Frequency Counter

VHS Alignment Tape, ..... VFMS0001H6

1. Remove the Bottom Case, Cassette Cover, Top Case, Front Panel and Bottom & Front PCBs.



2. Connect the frequency counter to the output terminals of the capstan FG signal. (Connect one to TP2001 and the other to ground line.)

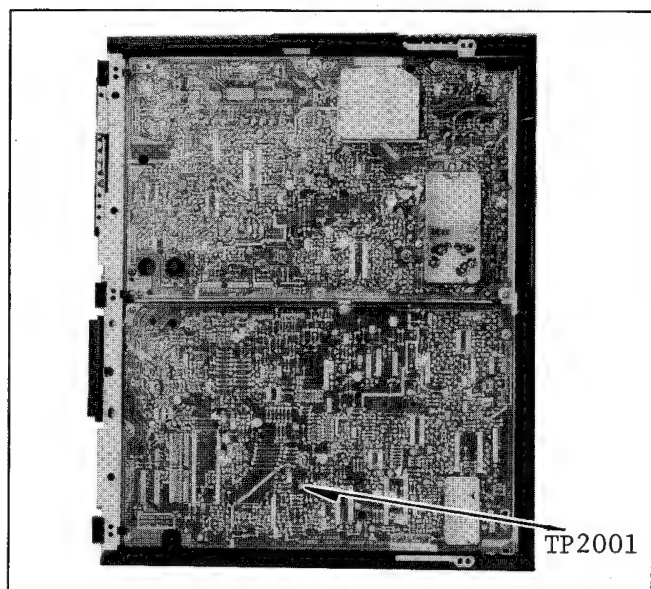


Fig. M22 Location of TP2001

3. Playback the monoscope portion of the alignment tape and wait until tape movement is well stabilized.
4. Read the frequency counter and confirm that it is within the specification.
5. If it is out of spec., use appropriate belt to obtain specified tape speed, note that 3 different capstan belts are available.




Part NO. of Belt	Mark on Belt (Rotating Direction)	Case of Use
VDVS0029A		Less than 1073.9 Hz
VDVS0029B		Within Spec. 1078.9±5Hz
VDVS0029C		More than 1083.9 Hz

Fig. M23 Indication on Belt

6. When replacing the Capstan Belt, first remove 2 screws (A), Thrust Holder, and the Fast Wind Belt. Then remove the Capstan Belt and install the appropriate belt.

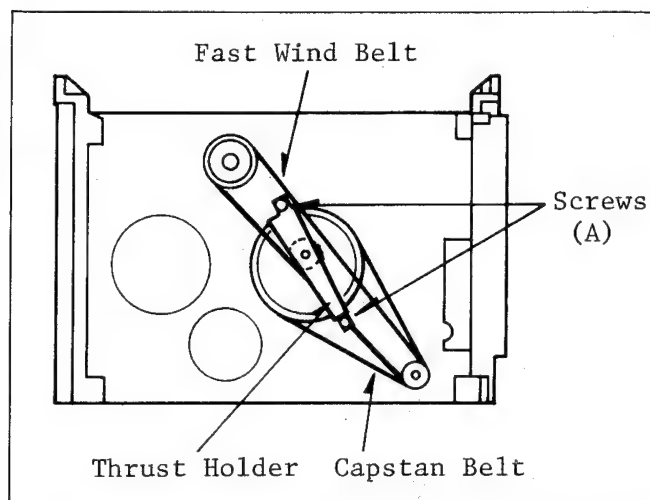


Fig. M24 Replacement of Capstan Belt

Notes:

1. Do not put any oil or grease on the belts or pulleys.
2. When installing a new capstan belt, make sure the group of two, three or four stripes is positioned in the direction of rotation of capstan motor pulley in PLAY mode and on outside.

7. POSITION ADJUSTMENT OF TENSION POST

\* Equipment Required:

Tension Post Adjustment Plate  
..... (VFKS0002)  
Fine Adjustment Screwdriver  
..... (VFKS0021)

1. Remove the Cassette Cover, Top Case, Cassette Up Unit and the Bottom Plate. Then stand the deck so that the left side of deck faces down.
2. Connect a jumper from Q6014 ② to GND, push PLAY button to complete loading, then disconnect the AC plug. Then place the deck upright.
3. Place the adjustment plate, slightly loosen screw securing the tension band bracket.
4. Insert the fine adjustment screwdriver into the hole and move the tension band bracket right or left so the tension post just touches the fixture.
5. Remove jumper.

**Note:**

Make sure that the TC link does not move when performing this adjustment.

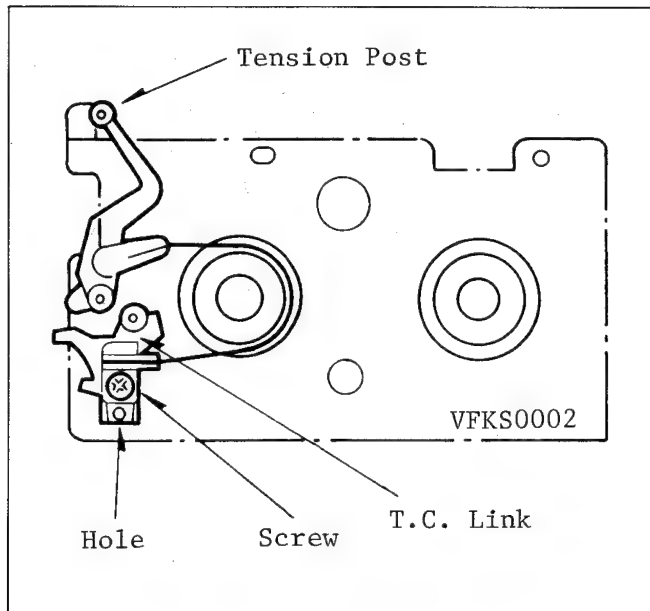


Fig. M25 Adj. of Tension Post

## 8. MEASUREMENT AND ADJUSTMENT OF BACK TENSION

### A: Measurement Procedure

#### \* Equipment Required:

Back Tension Meter (Tentelometer,  
Model T2-H7-UM, Purchase Locally)  
VHS Cassette Tape (120 Minute Tape)

#### \* Specification: 25 ~ 30g

1. Remove the Cassette Cover, Top Case, Cassette Up Unit and the Shield Case.
2. Pull the erase head in the direction indicated by the arrow and hold it with adhesive tape.
3. Play back the cassette tape from its beginning and wait until tape motion has stabilized. (for approx. 10 to 20 seconds)
4. Insert tension meter in tape path and confirm reading.
5. If the reading is out of spec., repeat the adjustment procedure.

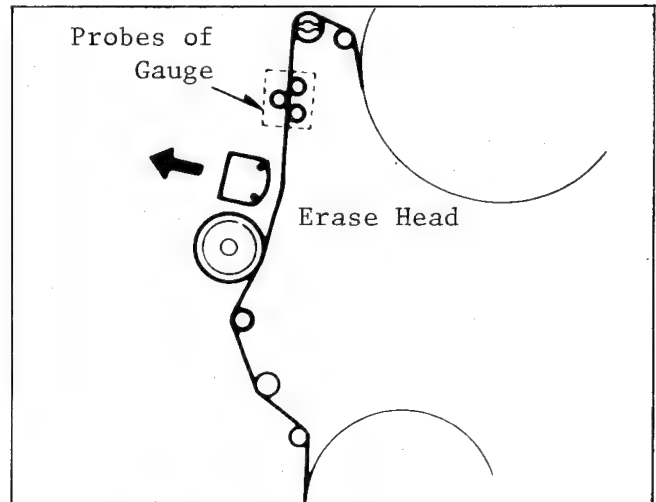


Fig. M26 Measurement of Back Tension

#### Notes:

1. Make sure that the three probes of the meter are all in solid contact with tape, but out of contact with any other parts while measuring.
2. It is recommended that measurements be taken three times as tension meter is very sensitive.

### B: Adjustment Procedure

#### \* Equipment Required:

Fine Adjustment Screwdriver.... (VFK0136)

1. Loosen screw (A) and insert the fine adjustment screwdriver into the hole (B).
2. Move the adjustment plate either right or left as indicated by the arrow to obtain the specified tension.  
Turn the driver clockwise to loosen tension, counterclockwise to tighten it.
3. Tighten screw (A) and verify tension with the meter once again.
4. Reinstall the cabinet parts.

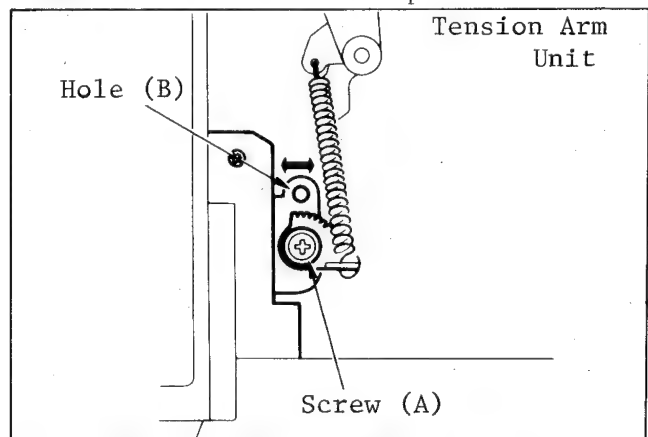


Fig. M27 Adj. of Back Tension

#### Note:

Upon completion of adjustment, remove the adhesive tape holding the erase head.

## 9. CONFIRMATION OF BRAKE TORQUE

### A. Confirmation Procedure

#### \* Equipment Required:

Dial Torque Gauge ..... (VFK0133)

Adaptor for Gauge ..... (VFK0134)

1. Connect a jumper from Q6014 ② to GND, push FF button. Then disconnect the AC plug.

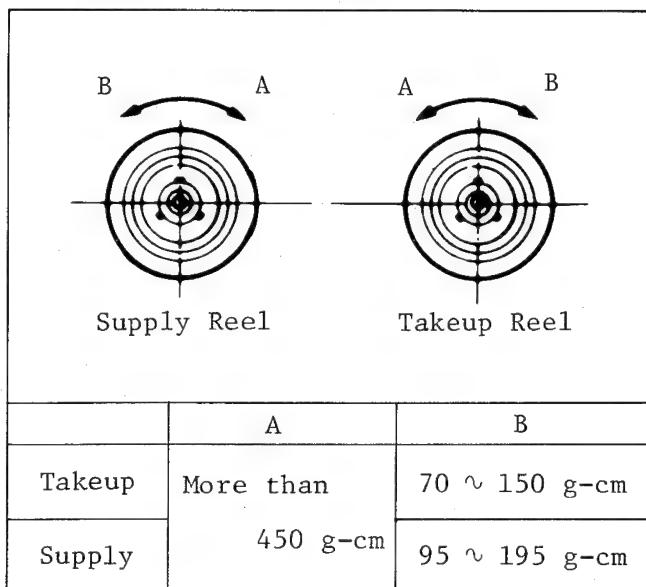


Fig. M28 Spec. of Brake Torque

2. Attach the adaptor to the torque gauge.
3. Place the torque gauge on the reel table. The weight of gauge should not rest on the reel table.

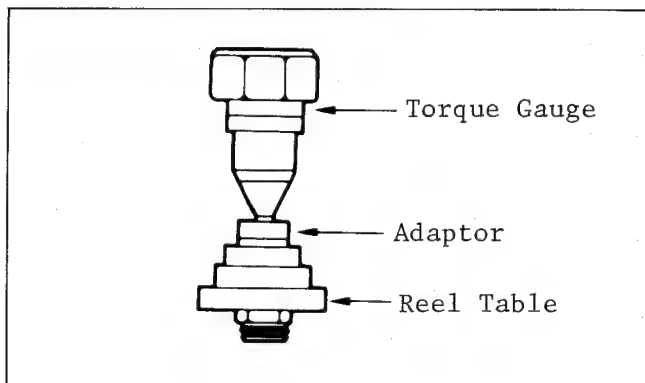


Fig. M29 Measuring Method

4. Turn torque gauge in the direction indicated as A or B until the brake begins slipping. Read the torque when it begins slipping.

#### Note:

If proper brake torque can not be obtained, clean the rotating surface of reel table with a soft cloth and recheck torque before replacing brakes.

## 10. CONFIRMATION OF TAKEUP TORQUE

### \* Equipment Required:

Dial Torque Gauge ..... (VFK0133)

Adaptor for Gauge ..... (VFK0134)

### \* Specifications:

in PLAY mode ..... 120 ~ 190g-cm

in FF and REWIND mode

..... More than 400g-cm

1. Attach the adaptor to the torque gauge.
2. Connect a jumper from Q6014 ② to GND, and TP2006 to TP6003, then Lower the cassette up unit (without cassette cover), and turn power switch on.
3. Set torque gauge to the Takeup Reel Table, push the play button and read torque on gauge. Also check torque on FF mode by pushing the FF button.

#### Note:

While measuring, the weight of gauge should not rest on the reel table.

4. Set torque gauge to the Supply Reel Table, press the rewind button for confirmation of the rewind mode.
5. Remove the jumpers and reinstall the cassette cover.

#### Note:

If the torque readings are off considerably, rollers or reel tables or drive belt may need replacement.

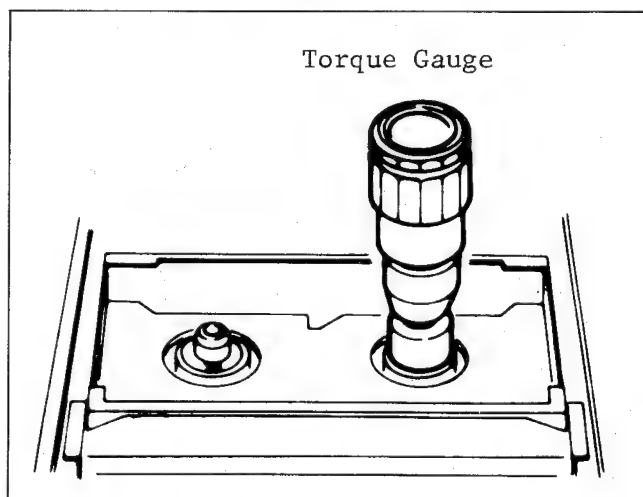


Fig. M30 Measuring Method

## 11. POSITION ADJUSTMENT OF SAFETY SWITCH

This adjustment is required only when the Safety Switch has been replaced or mounting screw has been loosened.

### \* Equipment Required:

Cassette Holder Fixture  
..... (VFKS0004)  
Fine Adjustment Screwdriver  
..... (VFK0136)

1. Remove the Cassette Cover, Top Case, Cassette Up Unit and Front Panel.
2. Place the fixture in place over the reel tables, and slightly loosen screw (A).
3. Insert the adjustment screwdriver into hole (B). Turn screwdriver counter clockwise and then slowly turn clockwise until switch turns on (it clicks). Tighten screw (A).

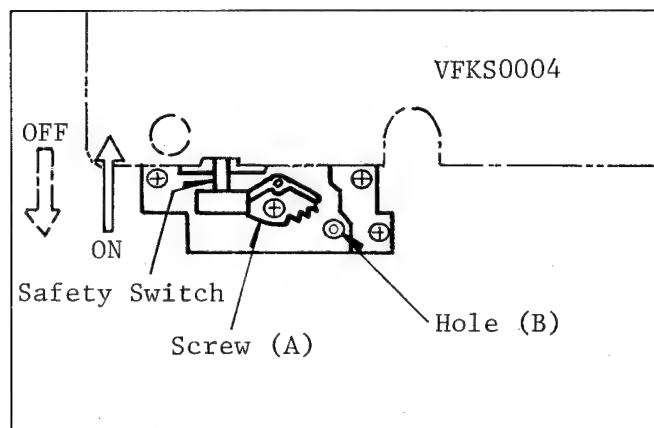


Fig. M31 Adj. of Rec. Safety SW.

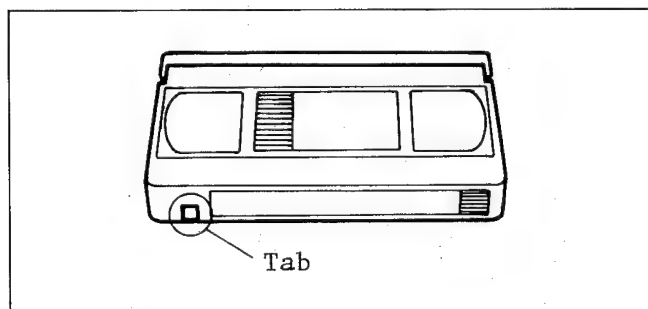


Fig. M32 Erase Tab on Cassette

### Note:

Confirm that the Safety Switch correctly turns ON and OFF using video cassettes with and without the safety tab removed.

## 12. ADJUSTMENT OF CASSETTE UP UNIT

### \* Equipment Required:

Cassette Holder Fixture  
..... (VFKS0004)

### Note:

Before adjustment, ensure that the cassette lock lever is unlatched.

1. Remove the Cassette Guide and slightly loosen 4 screws (A). Keep the cassette up unit in eject position.
2. Insert the fixture and push all the way in until it touched the tabs on the cassette holder. Hold the fixture and cassette holder together with your hand, then slowly lower them while watching all holes and cut-outs until the cassette holder latches.
3. Press the center portion of the fixture down so as not to miss the adjusted position, then tighten 4 screws (A).
4. Supply power to ensure smooth movement by repeatedly pressing down and ejecting the cassette up unit.

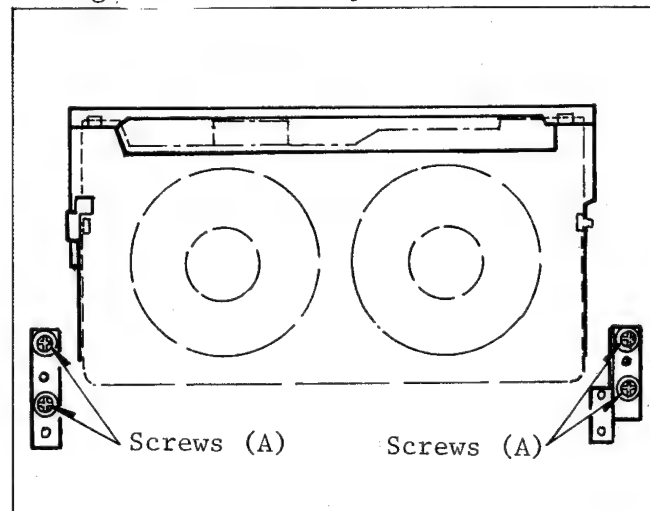


Fig. M33 Adj. of Cassette Up Unit

5. Replace the Cassette Guide and adjust it properly.

### 13. HEIGHT ADJUSTMENT OF REEL TABLES

**\* Equipment Required:**

Post Adjustment Plate ..... (VFKS0010)  
 Reel Table Height Fixture  
 ..... (VFKS0009)

**\* Specification** .....  $0 \pm 0.1\text{mm}$

1. Remove the Cassette Up Unit.
2. Place the post adjustment plate over the reels, and put the fixture on it. Set the fixture to zero "0" making sure that the scraper of fixture touches the cut-out portion of the plate.

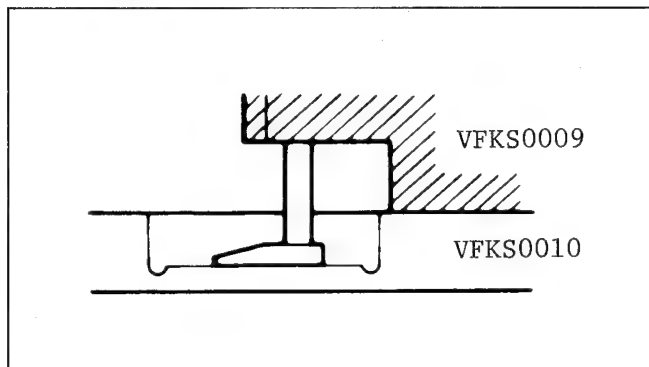


Fig. M34 Adj. of Reel Table Height - (1)

3. Then measure the top portion of reel table and confirm the difference against the condition just performed in former step. Do same for the other reel table.

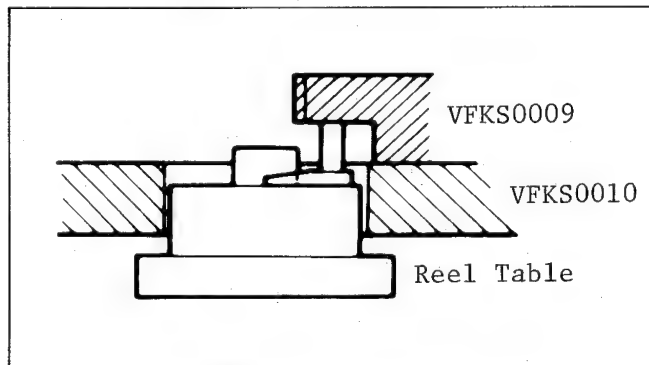


Fig. M35 Adj. of Reel Table Height - (2)

4. If the difference is more than  $0.1\text{mm}$  (higher or lower), adjust the height of reel table to obtain the specified height.
5. For adjustment, change the poly slider washer located under the reel table. (The washer is available in sizes of varying thickness,  $t=0.13\text{mm}$ ,  $0.25\text{mm}$  and  $0.5\text{mm}$ .)

### 14. HEIGHT ADJUSTMENT OF TAPE GUIDE POSTS

**\* Equipment Required:**

Hex. Wrench,  $0.9\text{mm}$  ..... (VFK0146)  
 Post Adjustment Plate ... (VFKS0010)  
 Reel Table Height Fixture  
 ..... (VFKS0009)

Nut Driver ..... (Purchase Locally)  
 Post Adjustment Screwdriver  
 ..... (VFK0137)

1. Remove the cassette up unit and place the adjustment plate.

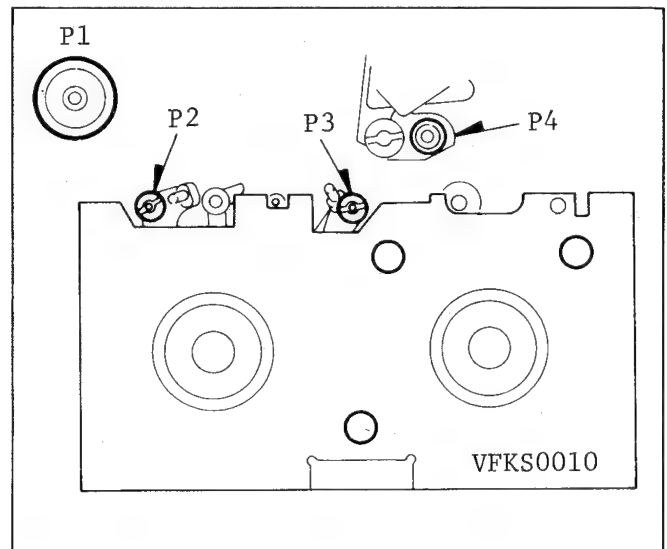


Fig. M36 Adj. of Tape Guide Post Height - (1)

2. First lower all posts so the condition of height becomes as shown. (Lower end of post and tape guide should be lower than scraper.) Loosen lock screw located at lower portion of posts (P2 & P3), then turn the posts with post adjustment screwdriver.

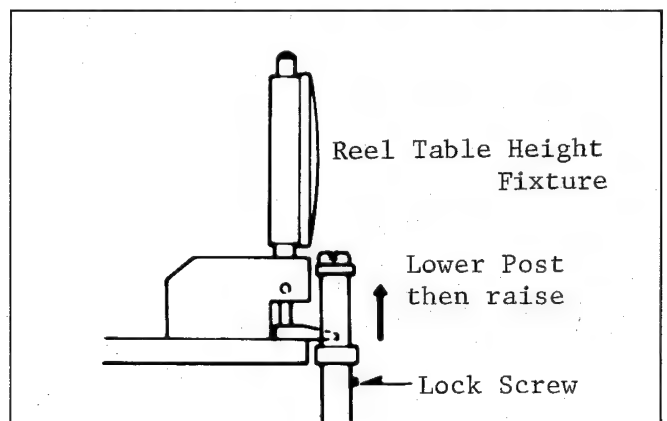


Fig. M37 Adj. of Tape Guide Post Height - (2)

- Place the fixture on the adjustment plate and fit the scraper to the post. The fit exactly scraper should as shown. (The scraper of the fixture should be fully lowered till it touches plate.)

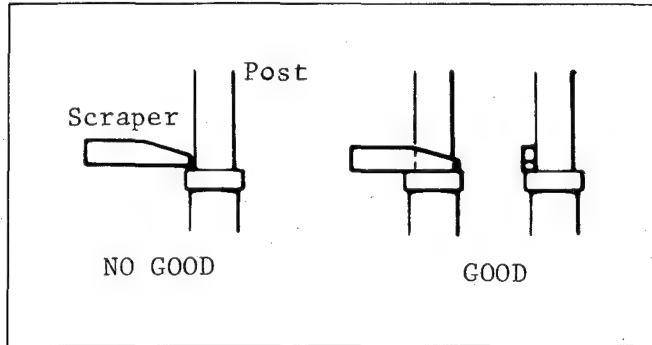


Fig. M38 Adj. of Tape Guide Post Height - (3)

- Set the fixture to zero "0" and slowly raise the post until it just touches the scraper. For adjustment of P1 and P4, use the nut driver. (The post cap on P4 can be removed by turning counterclockwise.) For adjustment of P2 and P3, use the post adjustment screwdriver.

**Note:**

Upon completion of adjustment, tighten lock screws on the P2 and P3 and also install the post cap on post 4. When the post cap on P4 is reinstalled, the position of it should be as shown below when viewed from the direction indicated by the arrow.

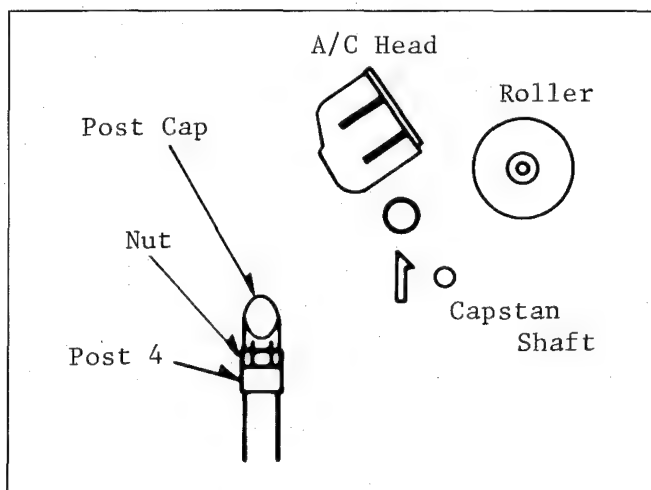


Fig. M39 Installation of Post Cap

## 15. TAPE INTERCHANGEABILITY ADJUSTMENT

**Note:**

To perform these adjustment/confirmation procedures, make sure that the tracking control is set in the detent (fixed) position.

**\* Equipment Required:**

Alignment Tape, ..... (VFMS0001H6)

Post adjustment Screwdriver

..... (VFK0137)

H-Position Adjustment Screwdriver

..... (VFKS0003)

Hex. Wrench, 0.9mm .. (VFK0146)

Hex. Wrench, 1.5mm .. (VFK76)

Oscilloscope

Nut Driver

(Purchase from local supplier), 7.0mm

### 15-A. CONFIRMATION OF TAPE TRAVEL

To prevent the alignment tape from being damaged, use a normal cassette tape for confirmation.

- Playback a cassette tape and confirm that tape travels without curling at the edges.

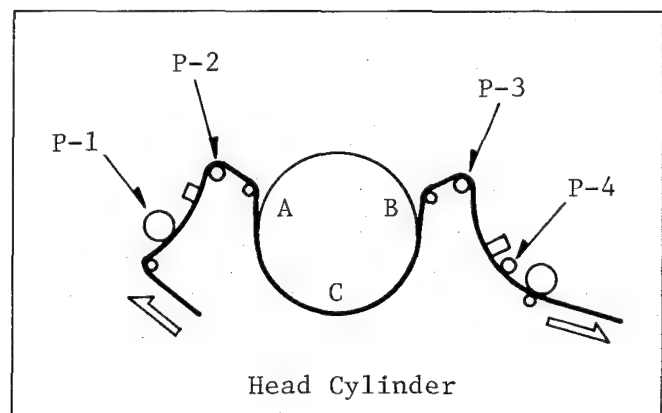


Fig. M40 Location of Posts



2. If curling is apparent, adjust the height of posts by turning the top of post with the post adjustment screwdriver (for P2 & P3) or nut driver (for P1 & P4). Before turning the posts, slightly loosen the lock screws on them and upon completion, retighten them.

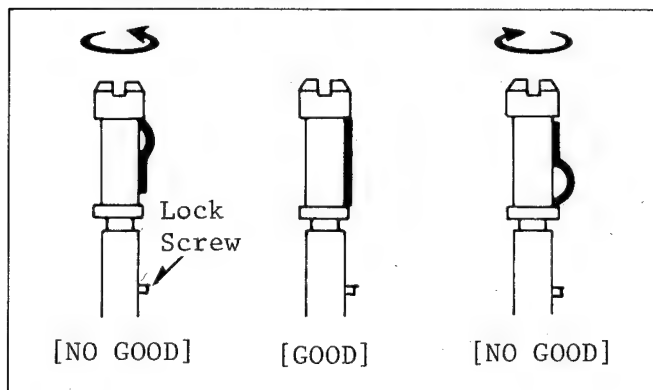


Fig. M41 Confirmation of Tape Travel

#### 15-B. CONFIRMATION OF A/C HEAD HEIGHT

This confirmation is required when the A/C Head was replaced and for preliminary height adjustment. For final adjustments, perform item 15-C, this page.

1. Looking at the lower edge of the control head with the tape running, ensure that the lower edge of tape runs along the lower edge of the control head.
2. If it doesn't, slightly turn nut (A) in one of directions to correct it. Turn it clockwise to lower the head, counterclockwise to raise it.

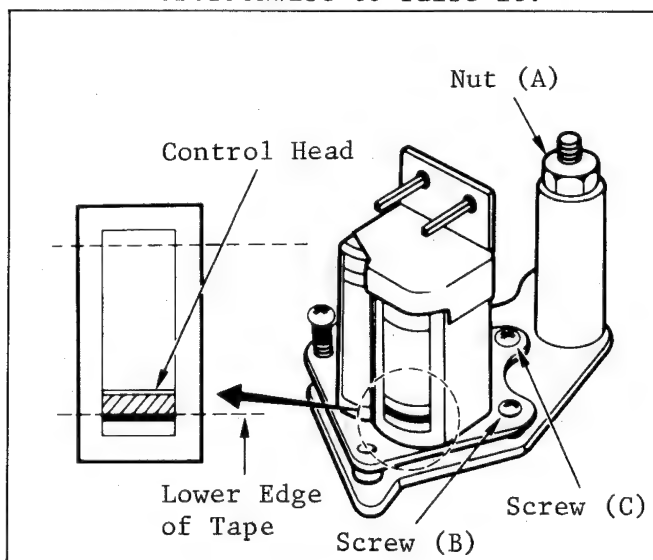


Fig. 42 Confirmation of A/C Head Height

#### 15-C. CONFIRMATION OF TILT OF A/C HEAD

This procedure should be performed after the height adjustment of P4.

1. Playback the tape and confirm that the tape runs between lower and top limiters of post. Also confirm that the tape is running smoothly.
2. If adjustment is required, turn clockwise until the screw (C) curling is apparent at lower edge of P4. Then turn the screw (C) counterclockwise until the curling is smoothed out.

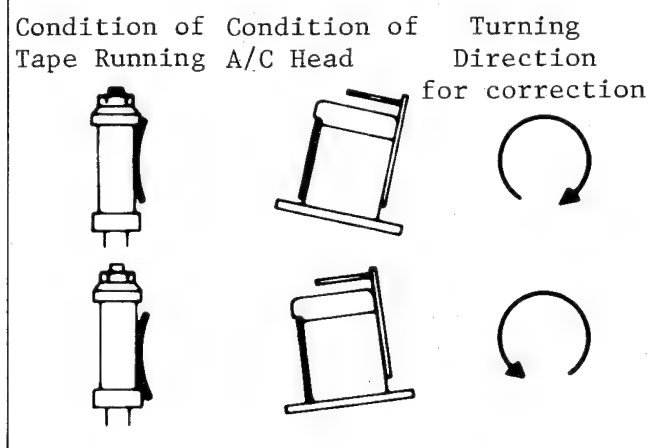


Fig. M43 Confirmation of A/C Head Tilt

#### 15-D. HEIGHT AND AZIMUTH ADJUSTMENT OF AC/HEAD

1. Connect the oscilloscope to the audio output jack on the rear of the deck.
2. Playback the monoscope portion (6kHz, Audio) of the alignment tape, VFMS0001H6.
3. Adjust the height by turning screw (B) indicated in Fig. M42 for the maximum output level. Slowly and gently turn screw (B) for this adjustment.

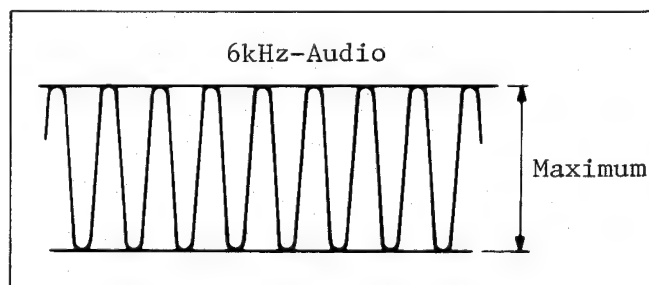


Fig. M44 Adj. of A/C Head Height

4. Readjust nut (A) for maximum output.

### 15-E. HORIZONTAL POSITION ADJUSTMENT OF A/C HEAD

1. Connect the oscilloscope to the Test Point, TP3014. Use TP2008 as a trigger.
2. Playback the monoscope portion of the alignment tape, VFMS0001H6 and confirm that RF envelope appears as in Fig. M47.
3. If adjustment is required, set the H-position screwdriver into the slot of the adjustment nut and rotate in either of right or left for the maximum envelope output.

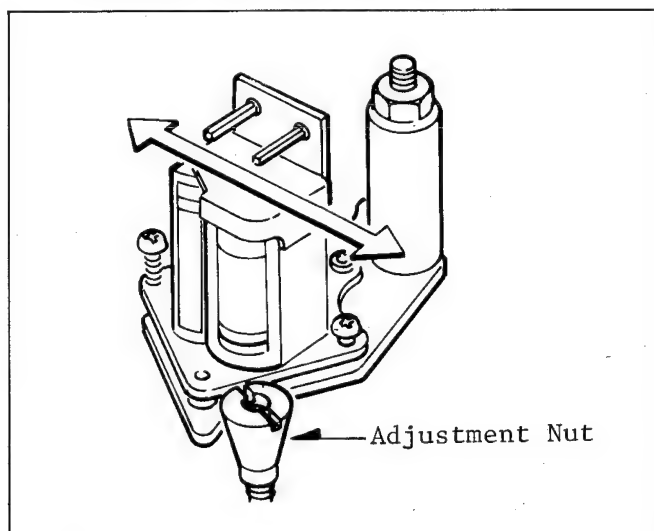


Fig. M45 A/C Head H-Position Adj.

### 15-F. CONFIRMATION/ADJUSTMENT OF ENVELOPE OUTPUT

1. Connect the oscilloscope to the Test Point, TP3014. Use TP2008 as a trigger.

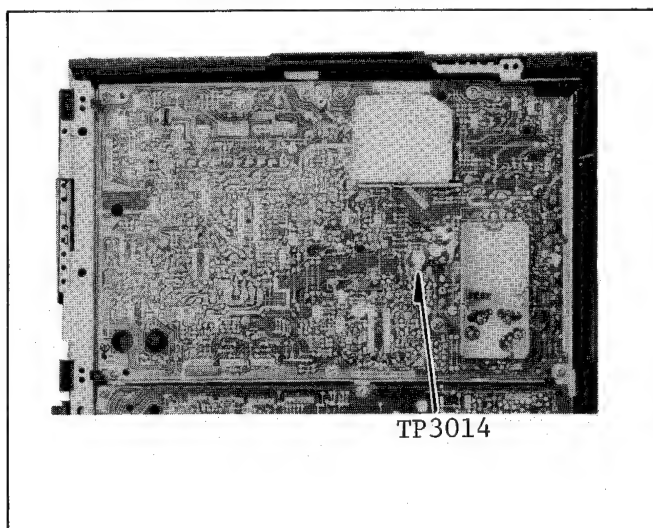


Fig. M46 Location of TP3014

2. Playback the monoscope portion of the alignment tape VFMS0001H6 and watching the scope display adjust the height of posts P2 and P3 by so the envelope figure becomes as flat as possible.  
( $V1/V_{\text{max}} \geq 0.7$ ,  $V2/V_{\text{max}} \geq 0.8$ )  
If adjustment is required, turn top of post with post adjustment screwdriver. For adjustment of P2 & P3, refer to step 2 of item 15-A.

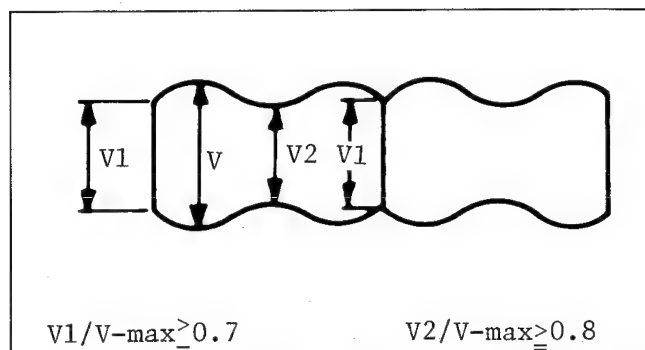


Fig. M47 Spec. of Envelope Figure - (1)

3. When the scope display is as follows, adjust the height of P2 so that the waveform looks like Fig. M50.

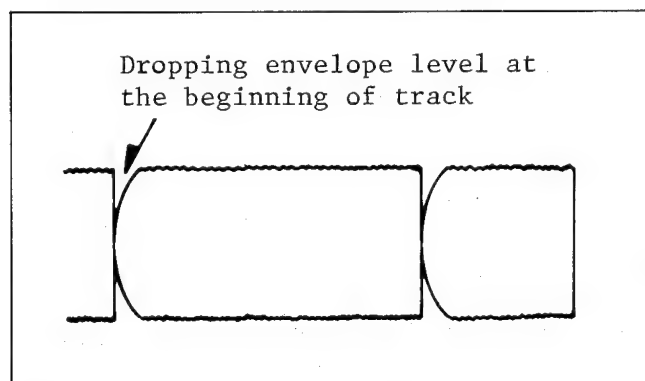


Fig. M48 Envelope Figure - (2)

- When the scope display is as follows, adjust the height of P3 so that the waveform looks like Fig. M50.

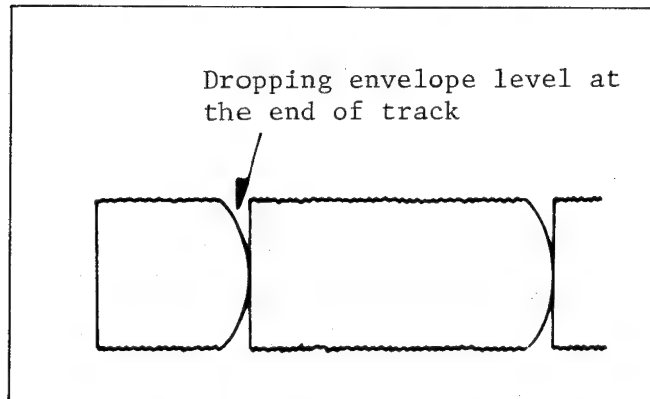


Fig. M49 Envelope Figure - (3)

- The scope display when P2 and P3 are adjusted correctly should appear as shown below.

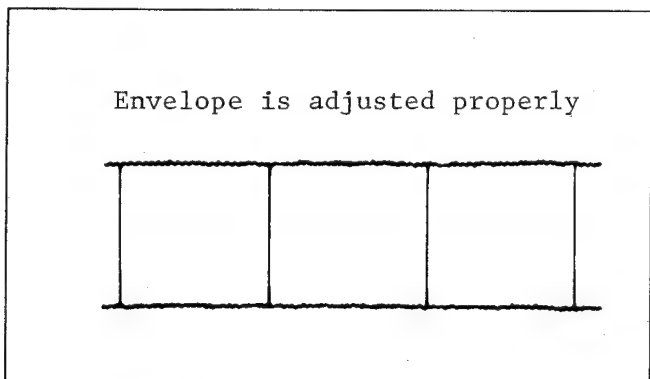


Fig. M50 Envelope Figure - (4)

#### 16. ADJUSTMENT OF V-STOPPERS

Equipment Required:  
V-Stopper Adjustment  
Fixture ..... VFKS0029

- Remove the D.D. Cylinder Unit from chassis. (Removal of Upper Cylinder Unit is not required.) Refer to "REPLACEMENT OF D.D. CYLINDER UNIT" section.
- Keeping 4 screws (A) loose, set the fixture. Push the V-stoppers snugly against the pins and tighten 4 screws (A).

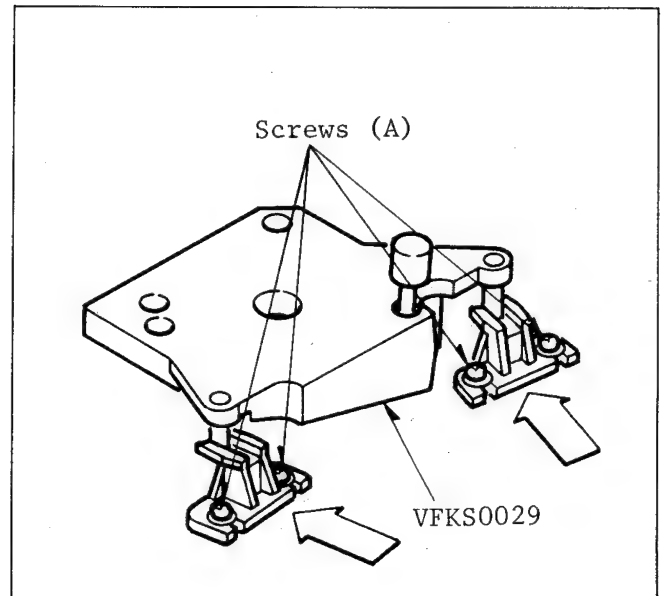


Fig. M51 Adjustment of V-Stoppers

- Upon completion of the adjustment, simulate loading completion to ensure that posts smoothly fit the V-stoppers. Then reinstall the D.D. Cylinder Unit.

#### 17. ADJUSTMENT OF CAM GEAR AND MODE SELECT SWITCH

General Condition:

The mechanism of this model is mostly engaged to the electrical circuit, System Control Circuit, through the mode select switch. Therefore the relation between the mode switch and the cam gear determines all further mechanical movement of the mechanical parts such as levers, gears, rollers and so on. If the adjustment of this item is performed improperly, the deck will be unloaded or automatically stopped. It will also result in damage to mechanical and electrical parts.

Note:

The Step 9 of this procedure describes the necessary adjustment if the mode select switch is replaced.

## Adjustment Procedures:

1. Turn loading gear clockwise until post 2 and 3 are fully unloaded. The small projection on the loading gear will be pointing up in the unloaded condition.

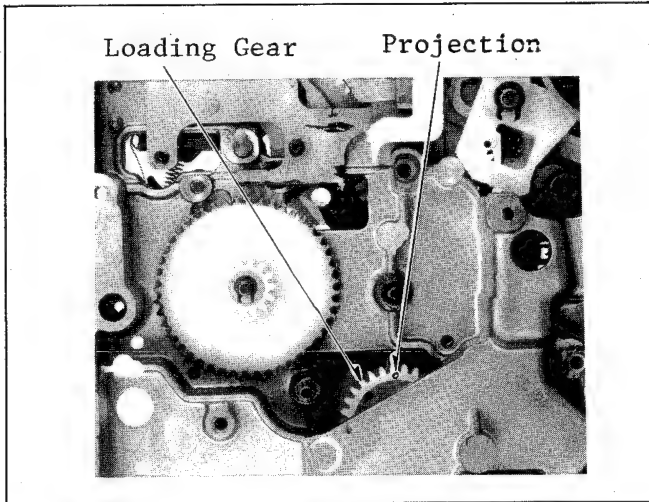


Fig. M52 Adj. Procedure - (1)

2. Install the action gear so the hole on the action gear meets the projection on the loading gear. Ensure that the loading gear is still in the fully unloaded condition

3. Slowly slide the main rod so it's V-shaped mark meets the V-shaped mark of the mode select switch. This will simulate stop mode (unloading completion) of main rod and mode select switch.

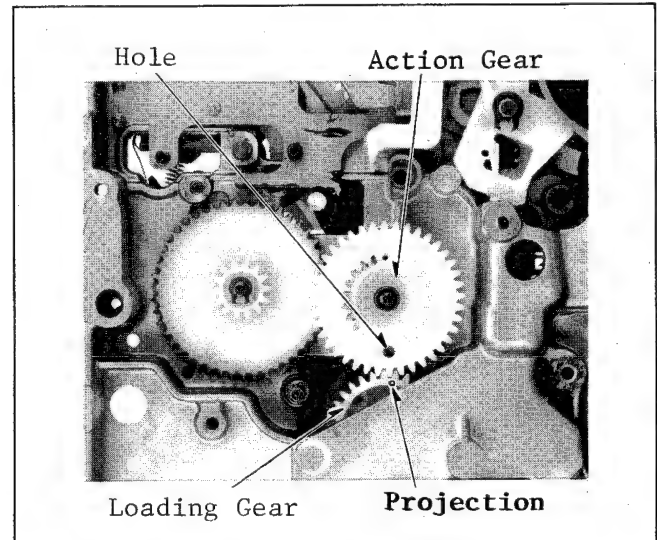


Fig. M53 Adj. Procedure - (2)

4. Insert the cam gear so hole (A) on the gear meets the hole on the main rod. To facilitate matching the two holes, use the small hex. wrench or a metal pin. Also ensure that the two V-shaped marks are matched and that the simple slot side of the cam gear is showing.

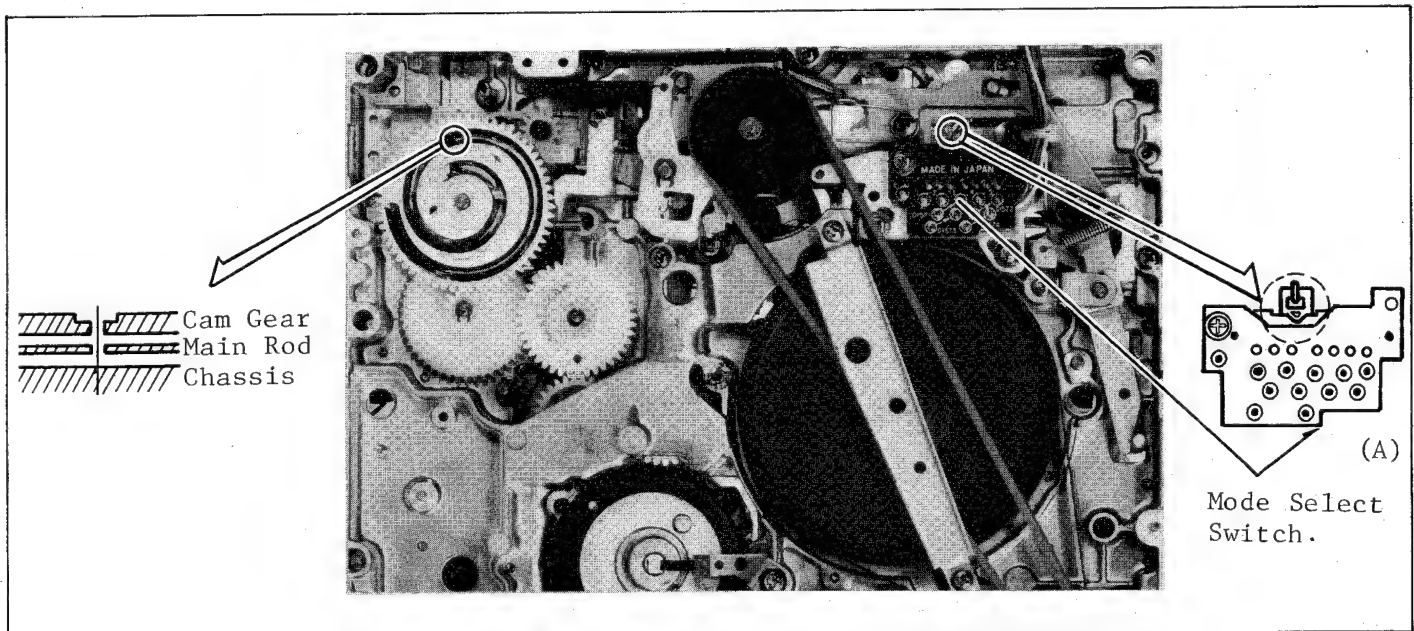


Fig. M54 Adj. Procedure - (3)

5. Install the sector gear so the pin on the sector gear meets the inner slot of the cam gear (simple slot side). Also install retaining ring in order to mount sector gear.

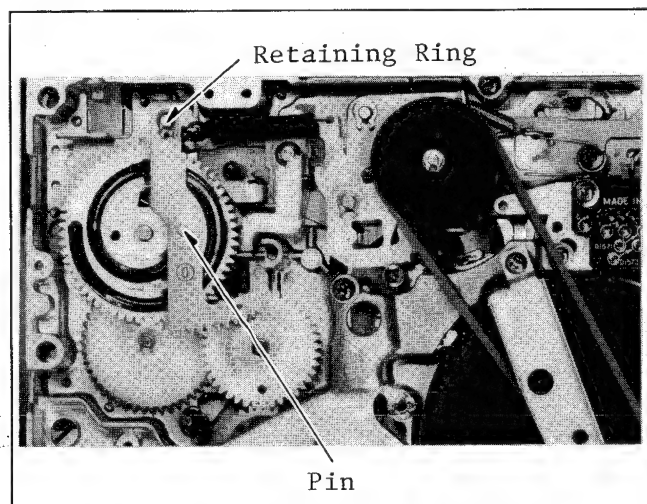


Fig. M55 Adj. Procedure - (4)

6. Completed adjustments should appear as illustrated below, and the two V-shaped marks should be matched at the mode select switch.

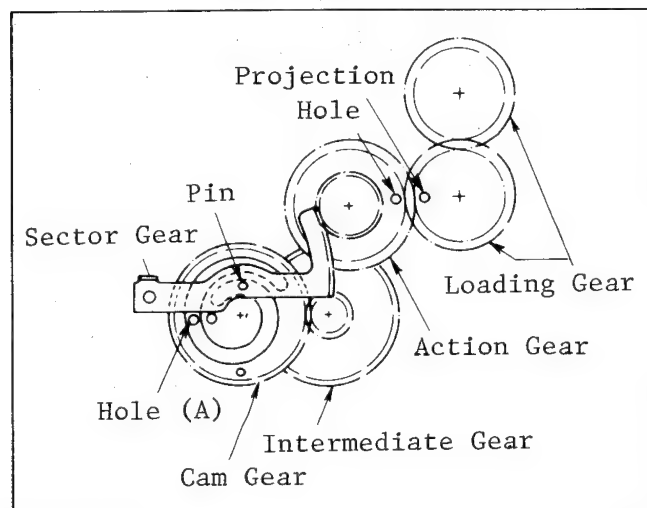


Fig. M56 Adj. Procedure - (5)

7. Install the gear protector and tighten the nut for mounting action gear, and install the E-Ring to mount cam gear. Also install the large Pulley so that teeth it's contact the outer teeth of the intermediate gear. Then install a retaining ring to mount it.

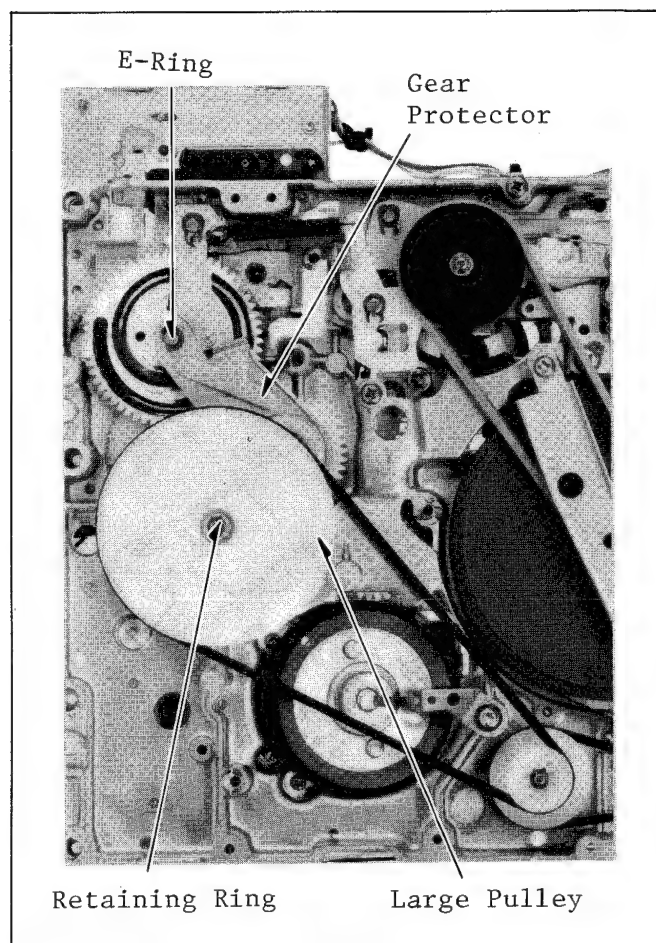


Fig. M57 Adj. Procedure - (6)

8. Install the loading belt. Turn the large pulley in both directions to confirm smooth movement of this mechanism.

3. Slightly loosen 2 screws (B), and press the plunger all the way in with your finger.
4. Insert the adjustment screwdriver into hole and rotate it either right or left to obtain the specified clearance between the Eject Lever and Lock Lever

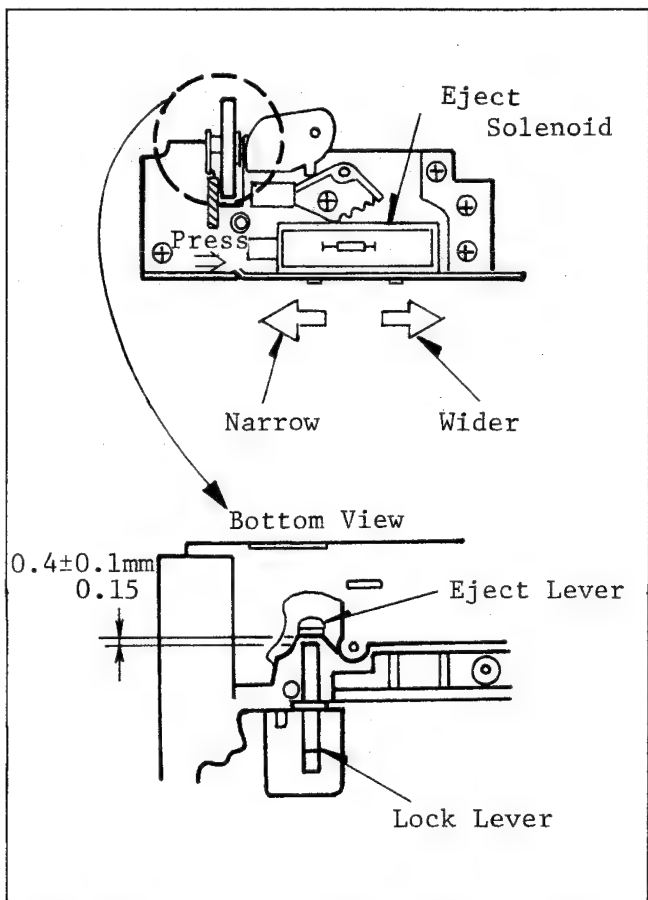
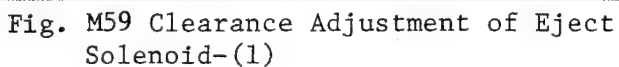


Fig. M60 Clearance Adjustment of Eject Solenoid-(2)

5. Then tighten 2 screws (B) and install the Eject Unit.

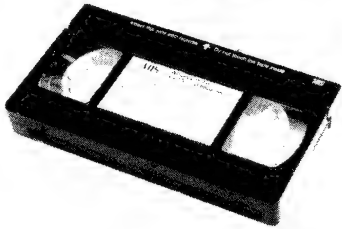
1. Remove the Cassette Compartment.
2. Remove 3 screws (A) and Eject Unit.





## Servicing Fixtures & Tools

**VFMS0001H6 VHS Alignment Tape**



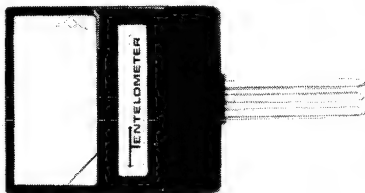
**VFK0137 Post Adjustment Screwdriver**



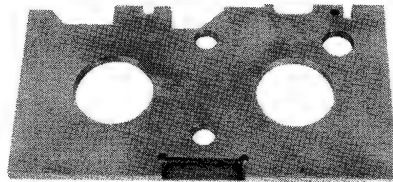
**VFKS0003 H-Position Adj Fixture**



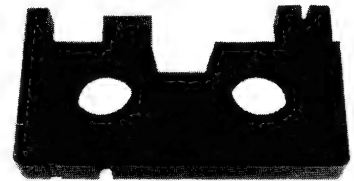
**Back Tension Meter  
(Tentelometer, Made in U.S.A.)**



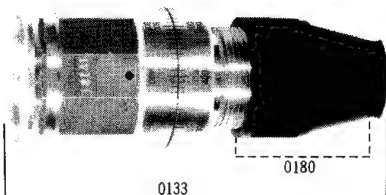
**VFKS0010 Post Adjustment Plate**



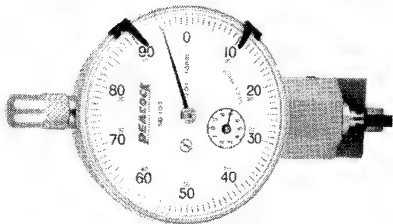
**VFKS0004 Cassette Holder Fixture**



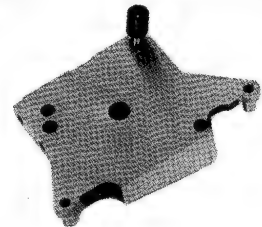
**VFK0133 Dial Torque Gauge  
VFK0180 (Plastic Clamper Only)**



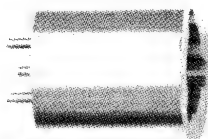
**VFKS0009 Reel Table Height Fixture**



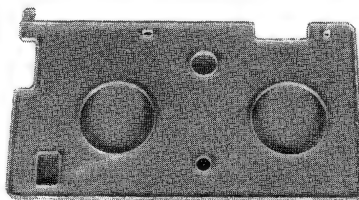
**VFKS0029 V-Stopper Adj Fixture**



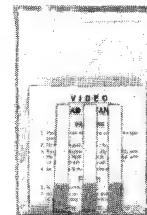
**VFK0134 Adaptor for VFK0133**



**VFKS0002 Tension Post Adj Plate**



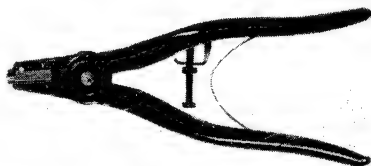
**VFK27 Head Cleaning Stick**



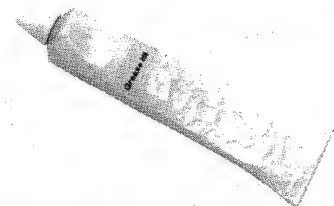
**VFK0136 Fine Adjustment Screwdriver (3mmφ)  
(Long Shaft)**  
**VFKS0021 Fine Adjustment Screwdriver (3mmφ)  
(Short Shaft)**



**VFK0144 Retaining Ring Remover (3mmφ)  
VFK0145 Retaining Ring Remover (4mmφ)**



**MOR265 Morlytone Grease**



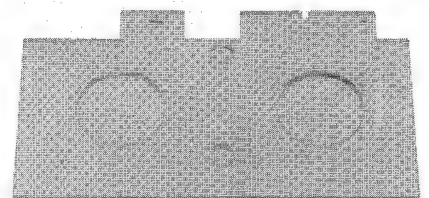
**VFKS0031 V-Hold Adj. Tool**



**VFK0146 Hex. Wrench (0.9mm)  
VFK76 Hex. Wrench (1.5mm)**



**VFKS0006 Guide Pin Fixture**





# ELECTRICAL ADJUSTMENT PROCEDURES

This section provides complete electrical adjustment procedures which may be required for electronic circuits of 3 speed selectable video cassette recorder with CUE and REVIEW features.

## 1. TEST EQUIPMENT

To perform the electrical adjustments completely, the following equipment is required.

1. DVM (Digital Volt Meter)  
Voltage Range: 0.001 – 50V
2. Dual-trace Oscilloscope  
Voltage Range: 0.005 – 50V/Div.  
Frequency Range: DC – 10MHz  
Probes: 10:1, 1:1
3. Frequency Counter  
Frequency Range: 0 – 150MHz
4. Signal Generator  
Sinewave: 0 – 10MHz
5. AC Millivolt Meter  
Voltage Range: 0 – 3mVrms.
6. Tuning Amp.
7. VIF Sweep Generator/Trap Adjuster
8. Spectrum Analyzer
9. DC Power Supply Unit  
Voltage: 0 – 15V DC
10. Variable Attenuator  
Attenuate:  $\pm 0$ dB – -50dB
11. Monitor Scope
12. Color TV Receiver or Monitor
13. V-Hold ADJ. Tool  
(VFKS0031)
14. Plastic Tip Driver and Non-Metal Driver
15. VHS Alignment Tape  
(VFMS0001H6)



Fig. E1

Start Counter Reading	0 (0)	0020 $\pm$ 8 (008 $\pm$ 6)	0135 $\pm$ 12 (060 $\pm$ 6)	0240 $\pm$ 20 (109 $\pm$ 10)
Video	Blank	Monoscope	Color Bars	Multi-Burst
Audio	Blank	6kHz (MONO)	3kHz (STEREO)	1kHz (MONO)

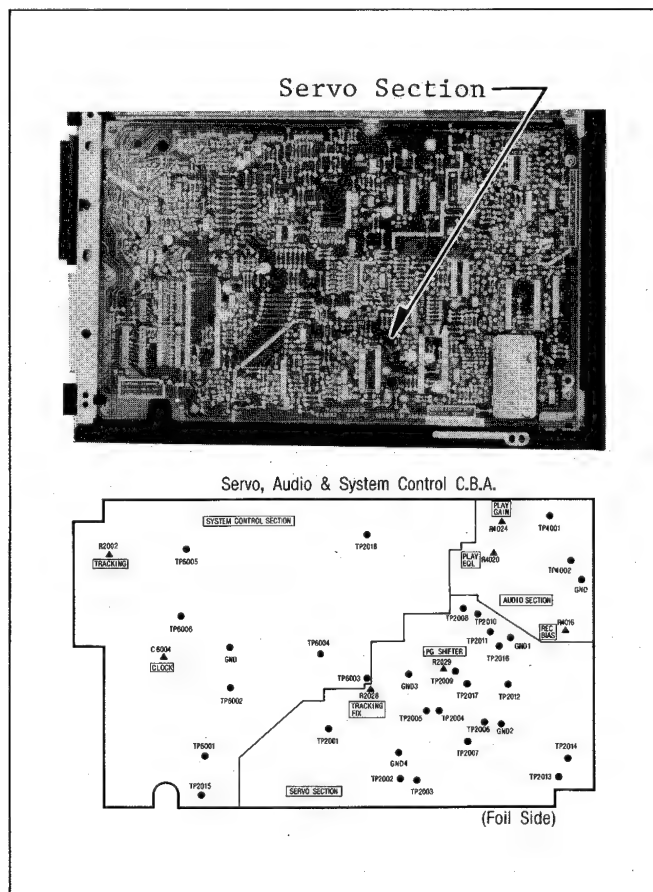
Fig. E2

## 2. ADJUSTMENT PROCEDURES

These adjustment procedures consist of the following sections.

1. Servo Section
2. Audio Section
3. Video Section
4. System Control Section
5. TV Demodulator Section

### 2-1. Servo Section



### 2-1-1. Head Switching Position Adjustment

Test Points: TP2008, TP3013  
Adjustment : R2029 (PG SHIFTER)

1. Playback color bar section of the alignment tape.
2. Connect the scope CH1 to TP3013 on the Luminance section and CH2 to TP2008 on the Servo section. Set the scope to the CHOP mode.
3. Also set the scope to the Delay mode or expand the vertical interval of the signal from TP3013.
4. Adjust the PG SHIFTER (R2029) so that the head switching point is  $6 \pm 1H$  before the start of vertical sync as shown below.

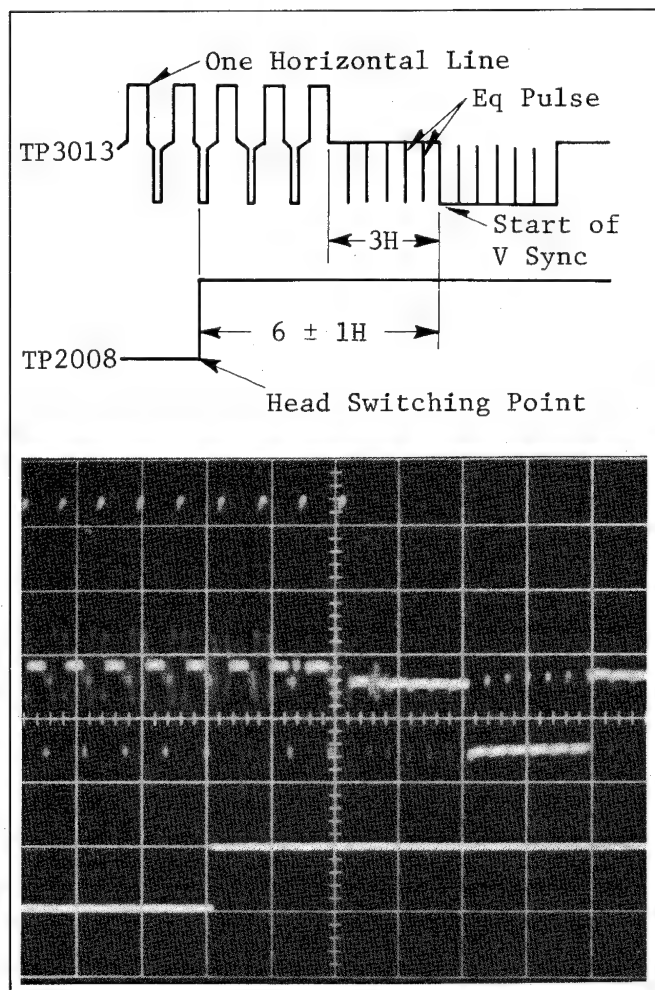


Fig. E4 TP3013 0.5V/0.1msec. div.  
TP2008 5V/0.1msec. div.

### 2-1-2. Tracking FIX Adjustment

Test Points: TP2008, TP2010  
Adjustment: R2028 (T. FIX)

1. Supply a video signal to the Video Input on the rear panel or tune in a local TV program.
2. Turn the Tracking Control on the front panel to the center detent point.
3. Insert a cassette and make a recording in the SP mode for a few minutes.
4. Playback the portion just recorded.
5. Connect the scope CH1 to TP2008 and CH2 to TP2010 on the Servo section.
6. Adjust the T. FIX (R2028) so that the T is  $0.4 \pm 0.4msec$ .

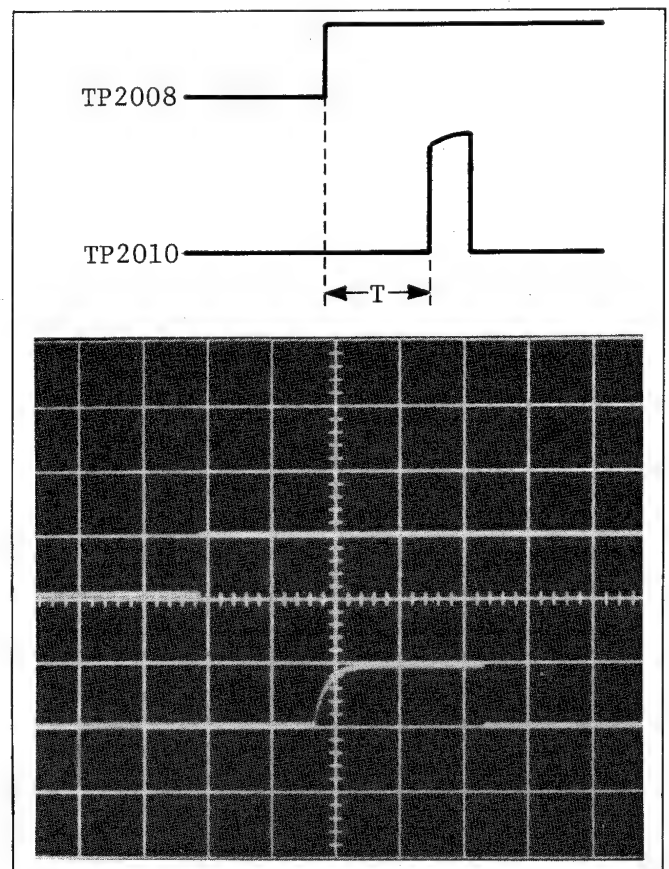
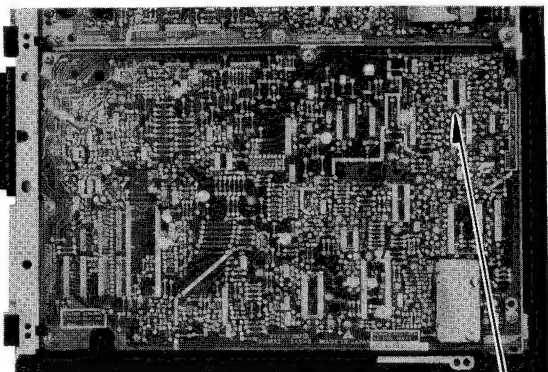


Fig. E5 TP2008 5V/0.2msec. div.  
TP2010 5V/0.2msec. div.

5. Change the slope selector on the scope from "+" to "-" and make sure that the other switching point is also  $6H \pm 1H$  before the beginning of vertical sync.

## 2-2. Audio Section



Audio Section

Servo, Audio & System Control C.B.A.

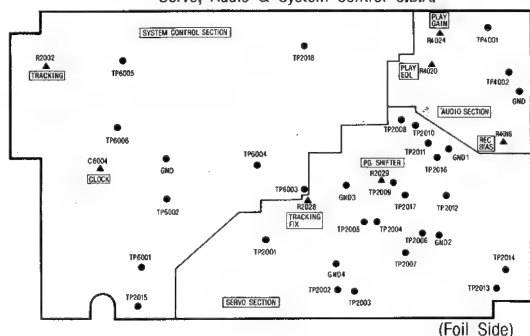


Fig. E6

### 2-2-1. Bias Current Adjustment

Test Point: Audio Head Terminal

Adjustment: R4016 (BIAS ADJ)

1. Plug in a phono plug to the Audio Input on the rear panel, but do not supply the Audio signal.
2. Insert a cassette and make a recording in the SP mode.
3. Connect the AC Millivolt Meter as shown below.

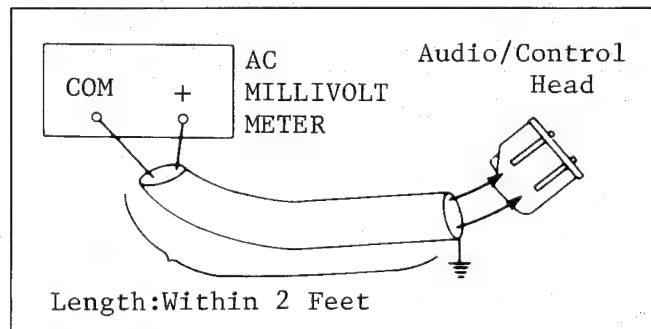


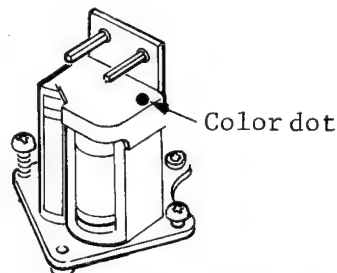
Fig. E7

4. While the recording is taking place, adjust the BIAS ADJ (R4016) on the Audio section so that the voltage is  $2.4 \pm 0.1\text{mVrms}$ .

(Specification should be decided by the color of the dot on A/C Head.)

COLOR DOT	ADJUSTMENT VOLTAGE
NO COLOR DOT	$2.4 \pm 0.05\text{mVrms}$
YELLOW COLOR	$2.1 \pm 0.05\text{mVrms}$
GREEN COLOR	$2.7 \pm 0.05\text{mVrms}$

Audio/Control Head



Adjustment should be made depending on the color of the dot on the A/C head as above.

Fig. E8

5. Remove the AC Millivolt Meter.

Note:

For service replacement, A/C Head without colordot is supplied.

### 2-2-2. Playback Gain and Equalization Adjustment

Test Point: TP4001

Adjustments: R4024 (PB GAIN)

R4020 (PB EQL)

1. Supply a sinewave signal (1kHz and 5kHz, -30dB, 89mVp-p) to the Audio Input on the rear panel.
2. Supply the video signal to the Video Input on the rear panel.
3. Connect the AC Millivolt Meter to TP4001 on the Audio section.
4. Insert a cassette and make a recording 1kHz first then 5kHz signal in the SP mode.  
Read the voltage of 1kHz.
5. Playback the portion just recorded.
6. Adjust PB GAIN (R4024) so that the voltage of playback is equal to that of recording.
7. Adjust the PB EQL (R4020) so that the 1kHz and 5kHz outputs are balanced.
8. Remove the AC Millivolt Meter.

## 2-3. Video Section

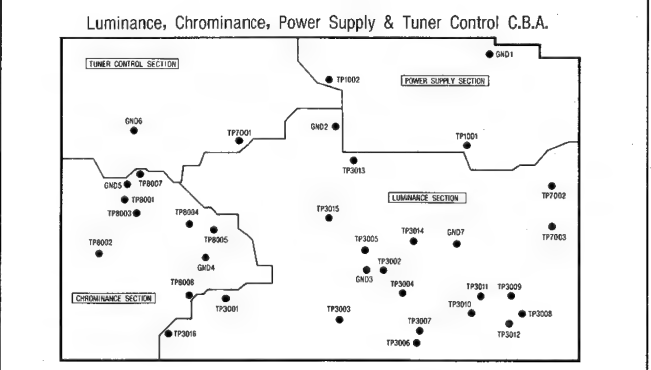
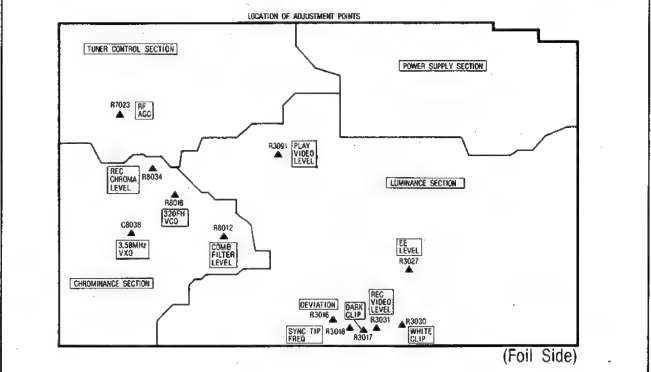
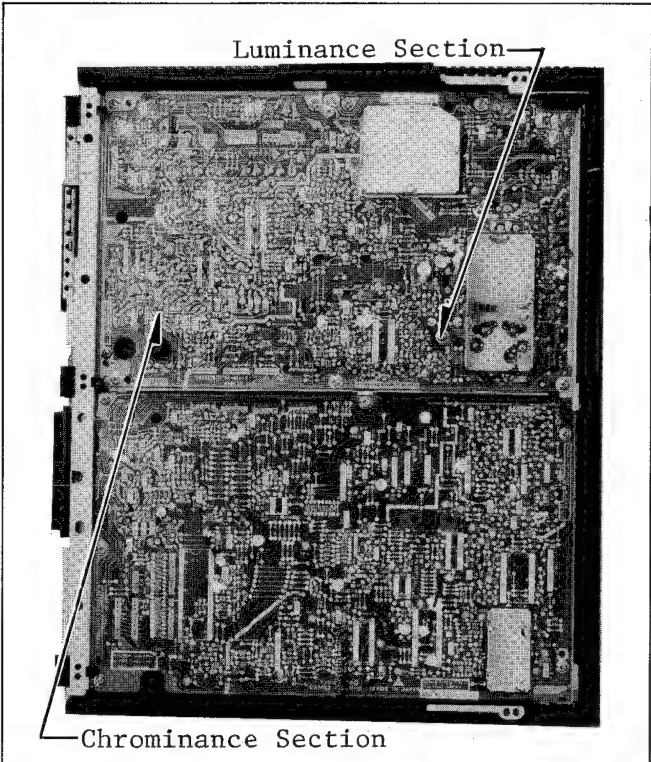


Fig. E9

2-3-1. E-E Level Adjustment

Test Point: TP3013

Adjustment: R3027 (E-E LEVEL)

1. Supply the video signal (1Vp-p) to the Video Input on the rear panel.
2. Connect the scope to TP3013 on the Luminance section.
3. Place the unit in STOP mode.
4. Adjust the E-E LEVEL (R3027) on the Luminance section so that the video level is  $1.95 \pm 0.1\text{Vp-p}$ .

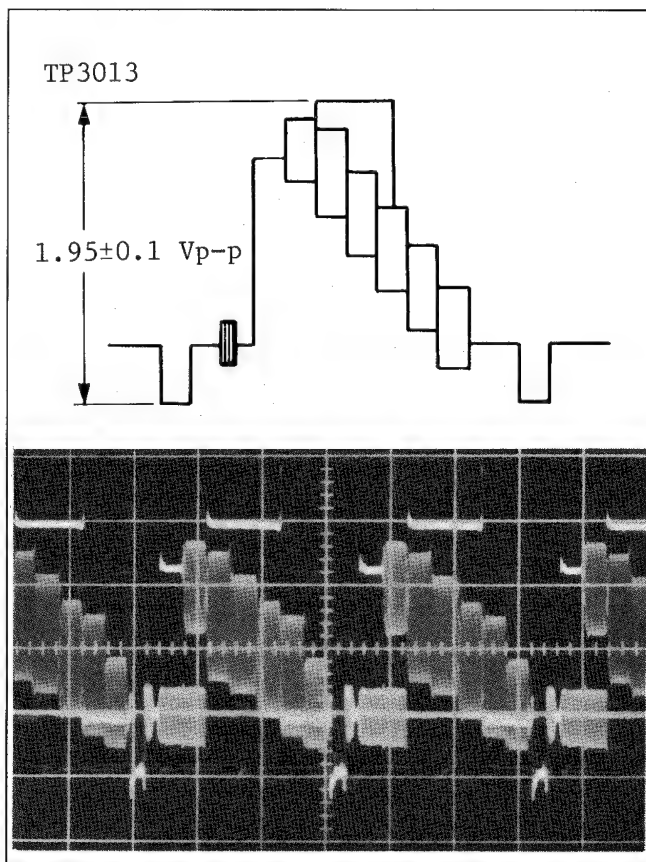


Fig. E10 TP3013 0.5V/20μsec. div.

### 2-3-2. Sync Tip Frequency and Deviation Adjustment

Test Point: TP3006

Adjustments: R3018 (SYNC TIP FREQ)

R3016 (DEVIATION)

1. Plug in a phono plug to the Video Input on the rear panel, but do not supply video signal.
2. Connect the frequency counter to TP3006 on the Luminance section.

3. Insert a cassette and place the unit in SP REC mode.
4. Adjust the SYNC TIP FREQ (R3018) so that the frequency is  $3.4 \pm 0.04\text{MHz}$ .
5. Remove the frequency counter.
6. Connect a  $0.01\mu\text{F}$  capacitor between TP3006 and TP3012 on the Luminance section.
7. Connect a signal generator (sinewave) to TP3012 through a  $1\text{k}\Omega$  resistor and a  $0.01\mu\text{F}$  capacitor.

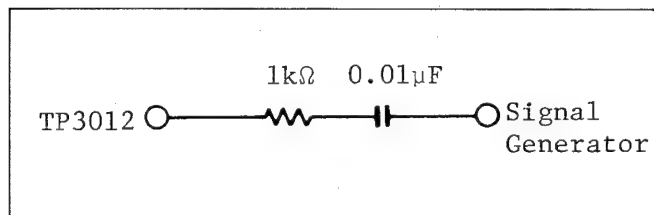


Fig. E11

8. Set the WHITE CLIP (R3030) and the DARK CLIP (R3017) to center position.
9. Supply a NTSC Color bar (100% White) signal to the Video Input on the rear panel.
10. Connect the  $1000\text{pF}$  capacitor between junction of R3091 and L3021, and GND.

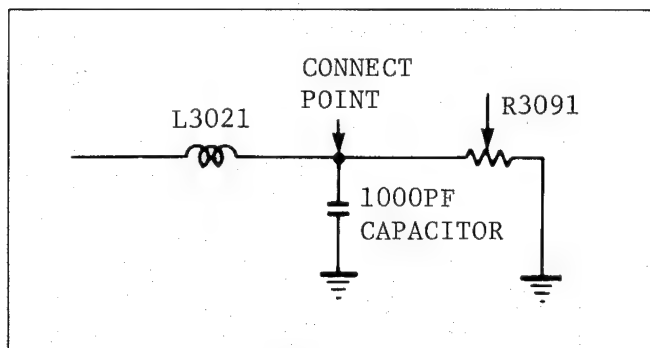


Fig. E12

11. Connect the scope to the junction of R3091 and L3021 on the Luminance section.
12. Set the frequency of the signal generator to  $4.35\text{MHz} \pm 40\text{kHz}$ .
13. Adjust the DEVIATION (R3016) for minimum carrier at peak white.
14. Remove the jumpers, resistors and capacitors.
15. Connect the scope to TP3013 on the Luminance section.
16. Insert a cassette and make a recording in the SP mode for a few minutes.

17. Playback the portion just recorded.
18. Confirm that the level of the video signal is  $1.95 \pm 0.1\text{Vp-p}$ .
19. Make White and Dark Clip adjustment.

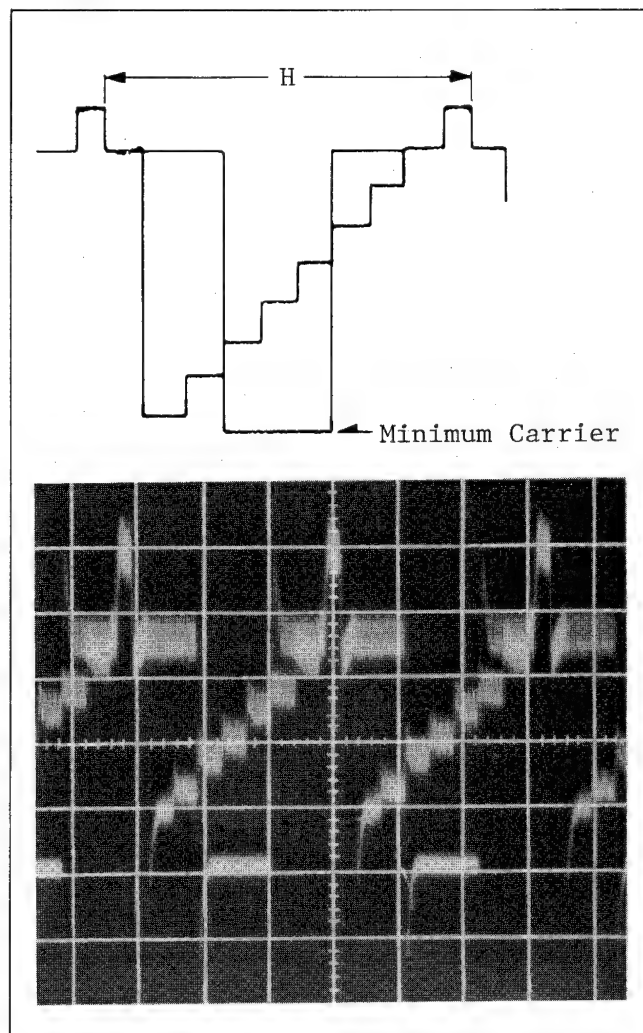


Fig. E13 20mV/20μsec. div.

### 2-3-3. White and Dark Clip Adjustment

Test Point: TP3003

Adjustments: R3017 (D CLIP)  
R3030 (W CLIP)

1. Supply a color bar signal to the Video Input on the rear panel.
2. Connect the scope to TP3003 on the Luminance section.
3. Place the unit in SP RECORD mode.



- Adjust the WHITE CLIP ADJ (R3030) and the DARK CLIP ADJ (R3017) on the Luminance section so that the overshoot and undershoot are as shown below.

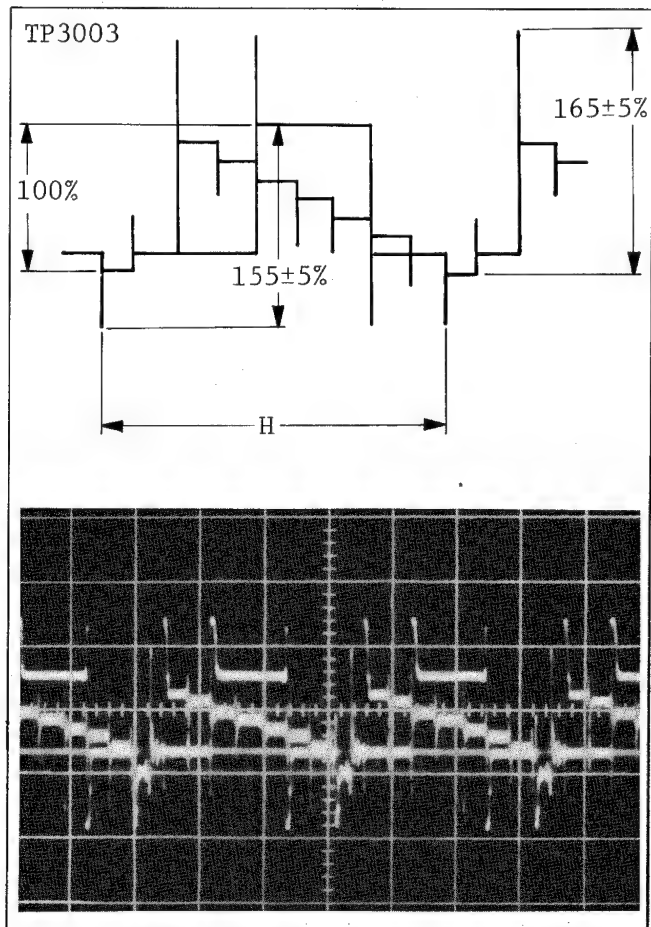


Fig. E14 TP3003 0.2V/20μsec. div.

#### 2-3-4. Recording Current Adjustment

Test Points: TP3009, TP3008

Adjustments: R3031 (REC CURR)  
R8034 (REC CHROMA)

- Supply a color bar signal to the Video Input on the rear panel.
- Insert a cassette and make a recording in the SP mode.
- Connect the scope between TP3009 (HOT) and TP3008 (GND) on the Luminance section. Use TP2008 as a trigger.
- Turn the REC CURR (R3031) fully clockwise from the foil side.
- Set the scope 20mV/div., 20μsec/div. Use Pin 22 of IC8001 as scope trigger.

- Adjust the REC CHROMA (R8034) on the Chrominance section so that the level of cyan portion is  $36 \pm 3\text{mVp-p}$ .

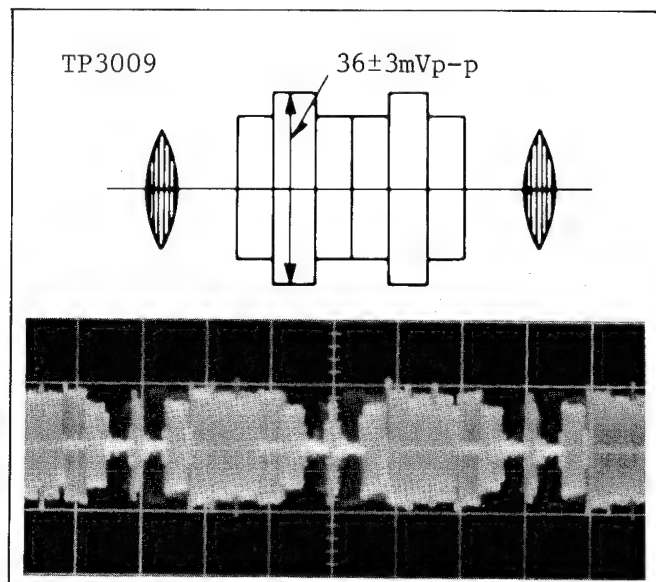


Fig. E15 TP3009 20mV/20μsec. div.

- Then set the scope 50mV-div., 2msec/div. Use TP2008 as scope trigger.
- Adjust the REC CURR (R3031) on the Luminance section so that the level of sync portion is  $140 \pm 3\text{mVp-p}$ .

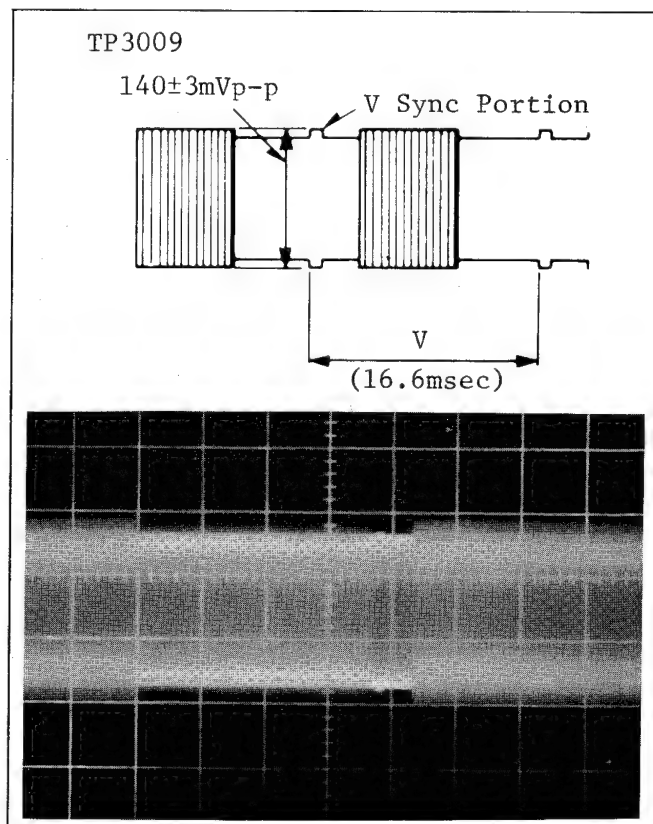


Fig. E16 TP3009 50mV/2msec. div.

### 2-3-5. 320FH VCO Adjustment

Test Point: TP8001

Adjustment: R8018 (320FH VCO)

1. Plug in a phono plug to the Video Input on the rear panel, but do not supply the video signal.
2. Connect a jumper between TP8003 and TP8004.
3. Connect a jumper between base of transistor Q6014 and GND.
4. Connect a jumper between TP6003 and TP2006, and place the unit in the play mode without a tape.
5. Connect the frequency counter to TP8001 on the Chrominance section.
6. Adjust the 320FH VCO (R8018) on the Chrominance section so that the frequency is  $4.2 \pm 0.5\text{MHz}$ .
7. Remove the jumpers.

### 2-3-6. 3.58MHz VXO Adjustment

Test Point: TP8002

Adjustment: C8038 (3.58MHz VXO)

1. Plug in a phono plug to the Video Input on the rear panel, but do not supply the video signal.
2. Connect a jumper between base of transistor Q6014 and GND.
3. Connect a jumper between TP6003 and TP2006, and place the unit in the play mode without a tape.
4. Connect the frequency counter TP8002 on the Chrominance section.
5. Adjust the 3.58MHz VXO (C8038) from the component side so that the frequency at TP8002 is  $3.579545\text{MHz} \pm 10\text{Hz}$ .

### 2-3-7. Comb Filter Adjustment

Test Point: TP3013

Adjustment: R8012 (COMB ADJ)

1. Supply a color bar signal to the Video Input on the rear panel.
2. Insert a cassette and make a recording in the SLP mode.
3. Connect the scope to TP3013 on the Luminance section.

4. Playback the portion just recorded.
5. Turn the Tracking Control on the front panel for the poorest tracking. (Worst playback image.)
6. During playback, adjust the COMB ADJ (R8012) on the Chrominance section from the component side as shown below.

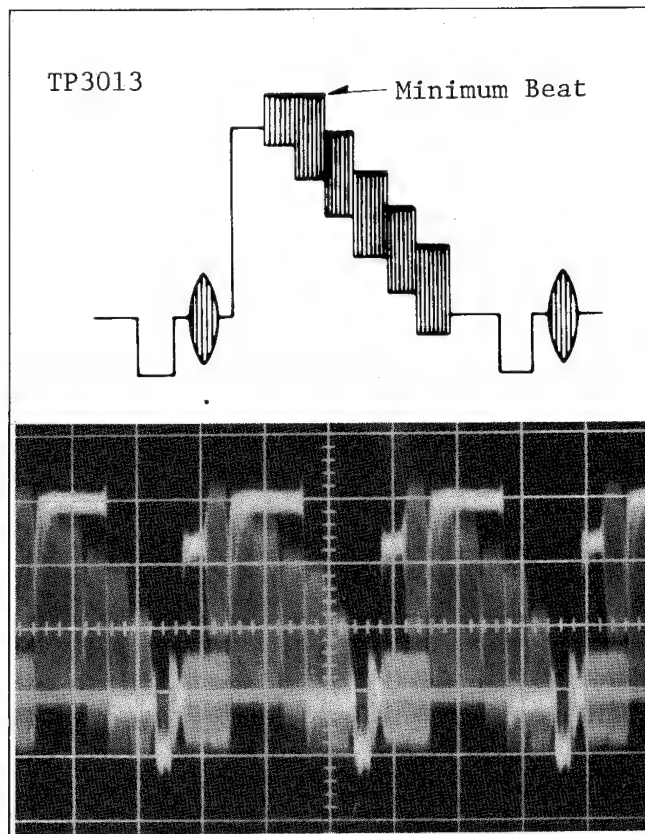


Fig. E17 TP3013 0.5V/20 $\mu$ sec. div.

### 2-3-8. Playback Level Adjustment

Test Point: TP3013

Adjustment: R3091 (VIDEO LEVEL)

1. Supply a color bar signal (1Vp-p) to the Video Input on the rear panel.
2. Insert a cassette and make a recording in the SP mode for a few minutes.
3. Connect the scope to TP3013 on the Luminance section.
4. Playback the portion just recorded.
5. During playback, adjust the VIDEO LEVEL (R3091) so that the video level is  $2.0 \pm 0.1\text{Vp-p}$ .
6. Confirm that the level of cyan portion is  $1.2 \pm 0.2\text{Vp-p}$ .



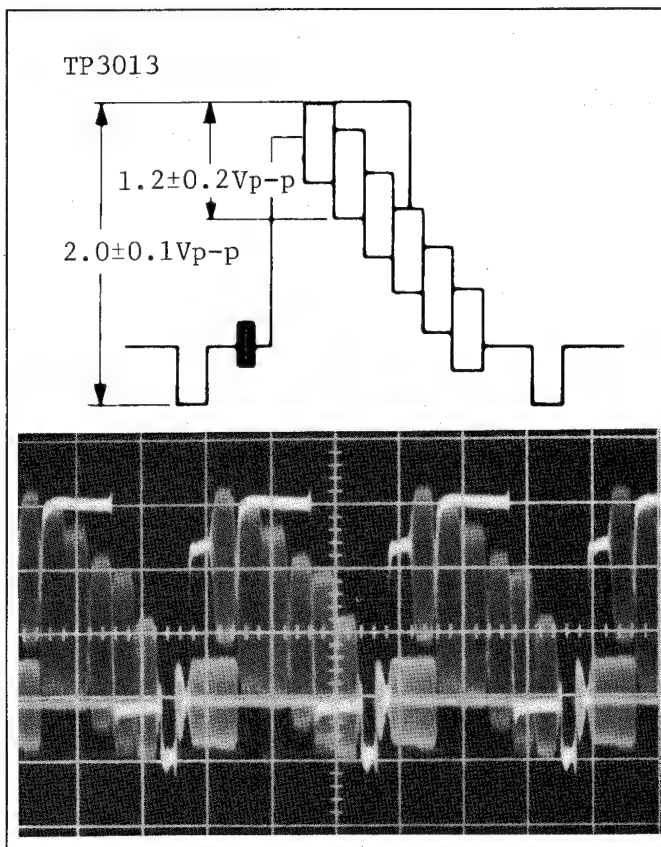


Fig. E18 TP3013 0.5V/20μsec. div.

#### 2-4. System Control Section

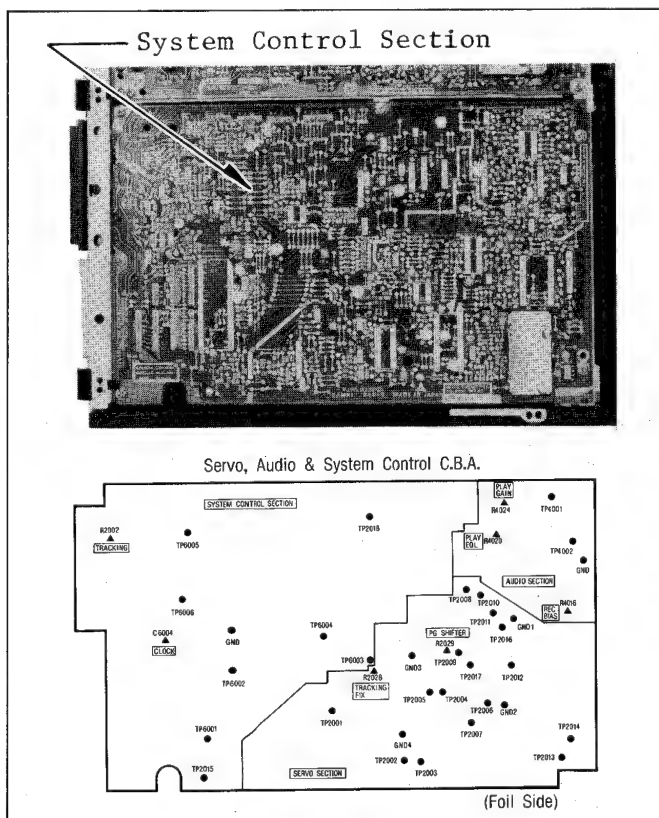


Fig. E19

#### 2-4-1. CLOCK Adjustment

Test Point: TP6002

Adjustment : C6004 (CLOCK)

1. Connect the frequency counter with 10:1 probe to TP6002 on the system control section.
2. Remove the jumper between TP6002 and junction of R6014 and R6012 on the foil side.
3. Adjust the CLOCK (C6004) from the component side so that the frequency at TP6002 is  $349.525 \pm 0.001\text{KHz}$ .
4. Remove the frequency counter.
5. Connect the TP6002 and the junction of R6014 and R6012 with the jumper.

#### 2-5. TV Demodulator Section

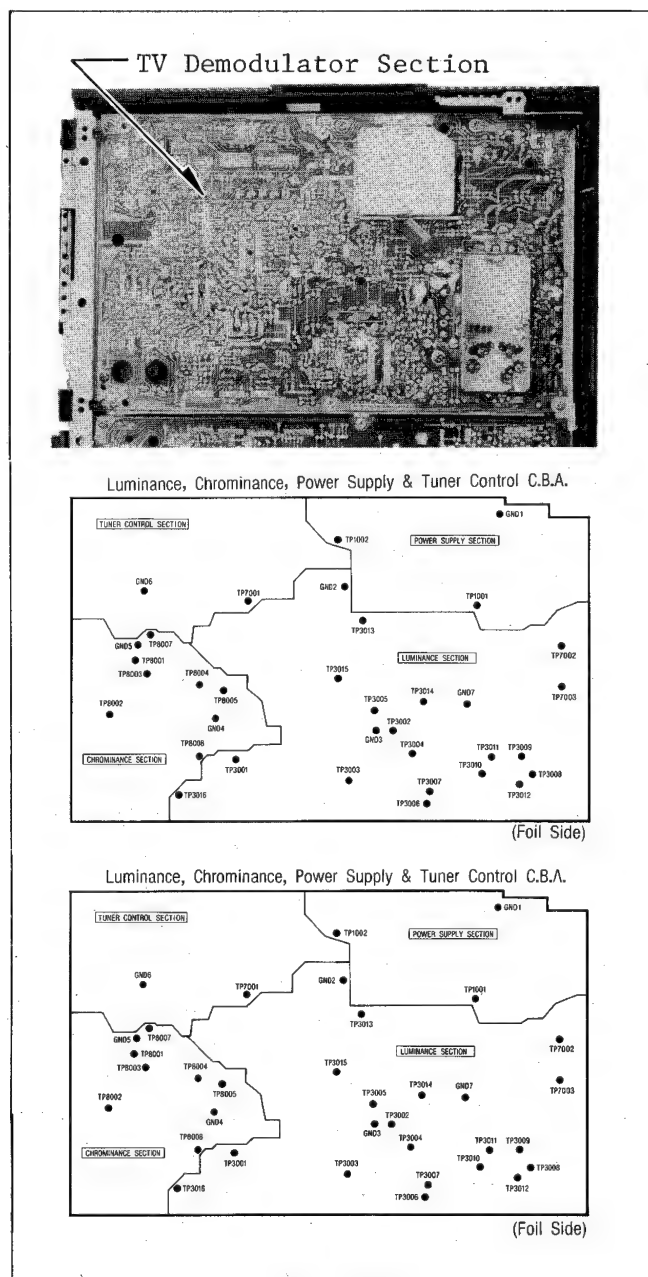
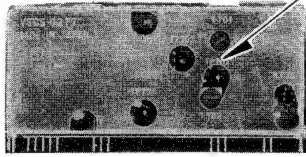
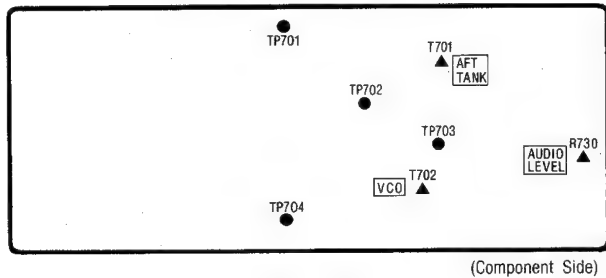


Fig. E20

TV Demodulator Unit



TV Demodulator UNIT



(Component Side)

Fig. E21

## 2-5-1. VIF Overall Adjustment and VCO Adjustment

Test Points: TP704, TP703

Adjustments: T702 (VCO)

Tuner converter coil L23  
(VIF Overall ADJ)

(CAUTION)

Since the TV Demodulator unit and UHF/VHF tuner unit have already been adjusted critically in factory, do not try to casually re-adjust them.

A: Factory Adjustment

### A-1. VIF Overall Adjustment

1. Connect the VIF Sweep Generator, Trap Adjuster and Monitor Scope as shown below.

Monitor Scope VIF Sweep & Trap Adjuster

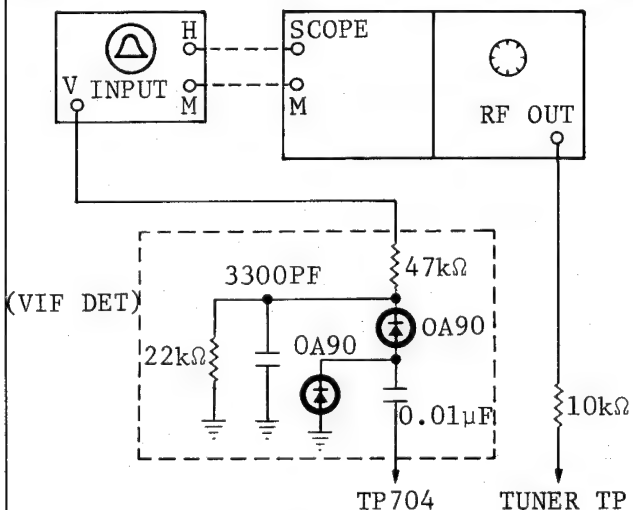


Fig. E22

2. Connect the output of the VIF Sweep Generator to tuner test point on the UHF/VHF tuner unit.
3. Connect the V Input of the Monitor Scope to TP704 on the TV Demodulator unit through VIF Detector.
4. Control to channel 13.
5. Connect the DC power supply unit to TP701 on the TV Demodulator unit.
6. Connect TP702 and GND with a 33μF/25V capacitor.
7. Adjust the VCO (T702) so that the beat portion is at center as shown below.

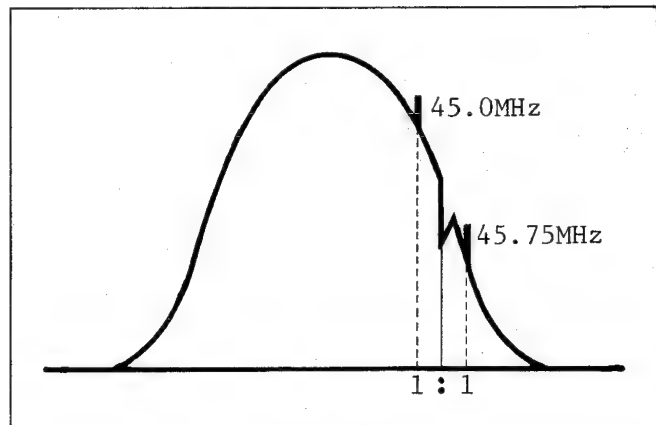


Fig. E23

8. Set the voltage on the TP701 so that the waveform level is maximum.
9. Adjust the output of the VIF Sweep Generator so that the A level is 1.0 Vp-p.

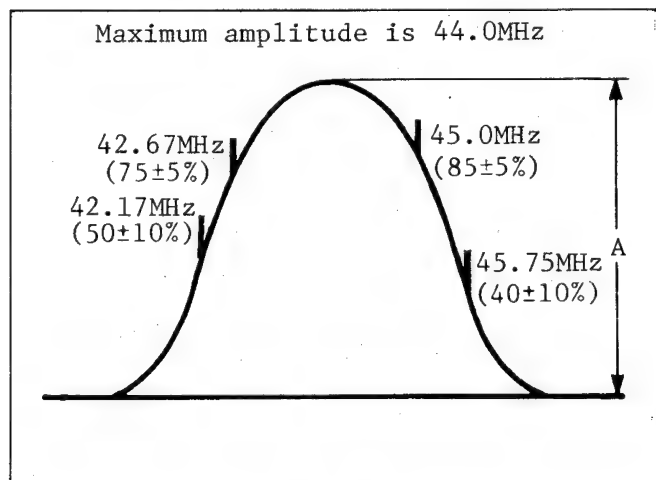


Fig. E24

10. Increase the VIF Sweep Generator output by 25dB.
11. Adjust the output of the DC Power Supply so that the A portion becomes 1.0Vp-p.
12. Adjust the tuner converter coil (L23) on the UHF/VHF tuner unit so that the sweep output waveform is as shown in Fig. E24.
13. Adjust the VCO (T702) so that the Beat portion is 45.75MHz marker as shown below.

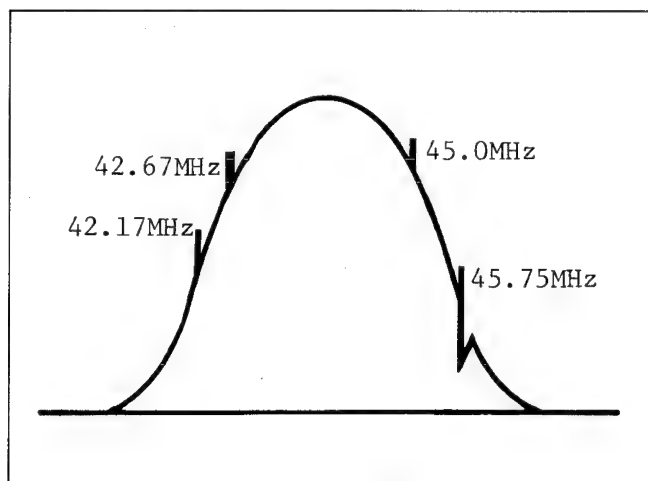


Fig. E25

#### A-2. VCO Adjustment

1. Adjust the DC power supply output by 0V.
2. Connect a 33 $\mu$ F/25V capacitor between TP702 and GND.
3. Connect the Frequency Counter to TP703 on the TV Demodulator unit through a Tuning Amp.

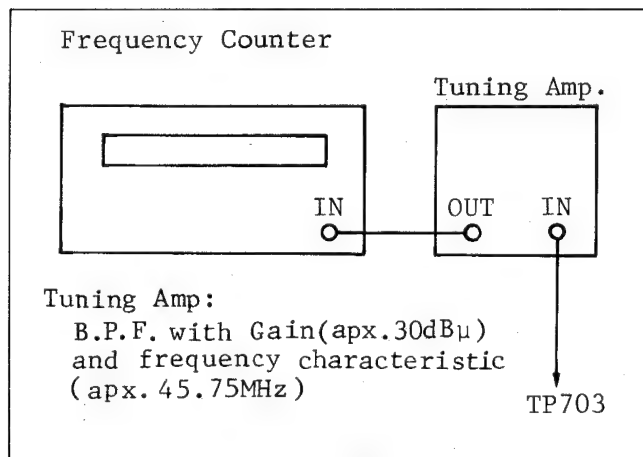


Fig. E26

4. Adjust the VCO (T702) so that the frequency is 45.75MHz $\pm$ 10kHz.

#### B. Field Adjustment

1. Supply the NTSC standard color bar signal to the RF Input on the rear panel and tune this signal.
2. Connect the scope to TP704 on the TV Demodulator unit.
3. Adjust the VCO (T702) so that the waveform is as shown below.

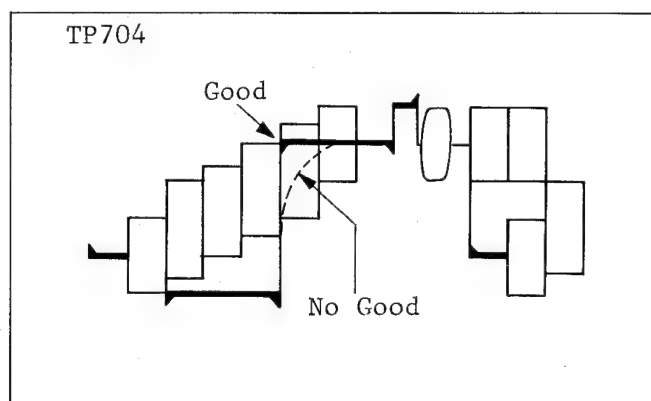


Fig. E27

4. Change the scope from TP704 to pin 6 of TV Demodulator unit.
5. Adjust the VIF Overall (Converter Coil L23) on the UHF/VHF tuner unit so that the burst level is 23 $\pm$ 1% of video level.

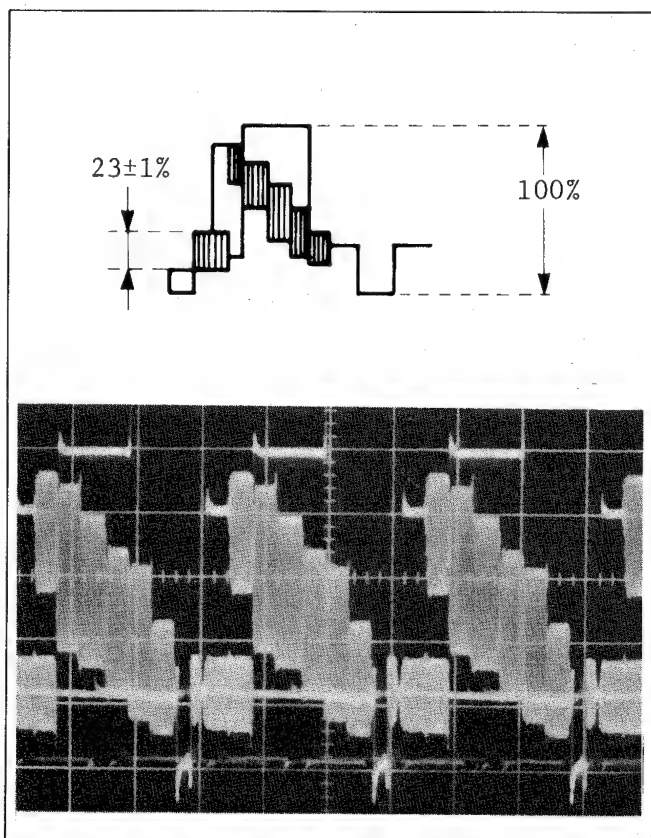


Fig. E28 Pin 6 of TV Demodulator Unit  
0.2V/20 $\mu$ sec. div.

### 2-5-2. AFT Trans Adjustment

Test Point: Tuner Test Point (TP)

Adjustment: T701 (AFT)

1. Tune in a local TV program on Channel 4.
2. Connect the frequency counter to tuner test point on the UHF/VHF tuner unit through a 10k $\Omega$  resistor.
3. Set the AFT switch on the front panel to "OFF".
4. Adjust the tuning VR on the front panel so that the frequency is 113.00  $\pm$  0.01MHz.
5. Set the AFT switch on the front panel to "ON".
6. Adjust the AFT (T701) so that the frequency is 113.00  $\pm$  0.005MHz.
7. Remove the frequency counter.

6. Then slowly turn the RF AGC (R7023) till just before the voltage drops.
7. Change the input electric field from 63dB $\mu$  to 66dB $\mu$ .
8. Confirm that the voltage at TP710 has dropped more than 1.0V.

### 2-5-3. Audio Level Adjustment

Test Point: Pin 15 of the TV Demodulator unit

Adjustment: R730 (AUDIO LEVEL)

1. Supply TV RF signal with audio modulation of 400Hz at 30% to the RF Input on the rear panel.
2. Connect the scope between pin 15 of the TV Demodulator unit and GND.
3. Adjust the AUDIO LEVEL (R730) so that the level is 133  $\pm$  20, -30mVp-p.

### 2-5-4. RF AGC Adjustment

Test Point: TP7001

Adjustment: R7023 (RF AGC)

1. Tune in a color bar signal (VHF).
2. Set the AFT switch to "ON" position.
3. Set the input level of electric field to 63dB $\mu$ .  
(Using the Attenuator and Spectrum Analyzer)
4. Connect the scope to TP7001 on the tuner control section.
5. Turn the RF AGC(R7023) on the tuner control section fully clockwise from foil side.

## Location of Test Points and Controls

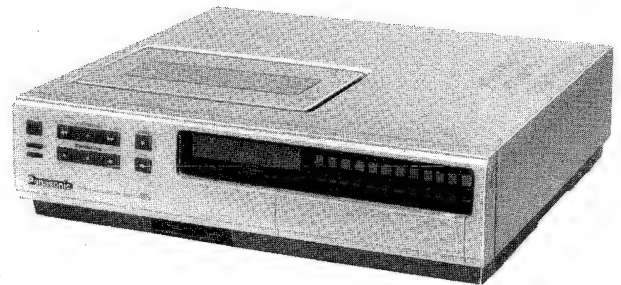
<p>TV Demodulator UNIT</p>	<p>Servo, Audio &amp; System Control C.B.A. / Luminance, Chrominance, Power Supply &amp; Tuner Control C.B.A.</p>	
<p>VEQS0240</p>	<p>VEPS0232A1 / VEPS0326A1</p>	
<div data-bbox="284 623 798 953"> <p>TV Demodulator unit</p> </div> <div data-bbox="258 1283 825 1581"> <p>TV Demodulator UNIT</p> <p>(Component Side)</p> </div>	<div data-bbox="958 590 1875 1085"> <p>Luminance, Chrominance, Power Supply &amp; Tuner Control C.B.A.</p> <p>Servo, Audio &amp; System Control C.B.A.</p> </div> <div data-bbox="958 1234 1765 1747"> <p>Servo, Audio &amp; System Control C.B.A.</p> </div>	

# Service Manual

Video Cassette Recorder

**Vol. 3**
**Panasonic** **VHS**  
**Omnivision**  
**PV-1220**

## Block Diagrams



### SPECIFICATIONS

**Power Source:** 120V AC  $\pm 10\%$ , 60 Hz  $\pm 0.5\%$   
**Power Consumption:** Approx. 21 watts  
**Television System:** EIA Standard (525 lines, 60 fields)  
 NTSC color signal

**Video Recording**  
 System: 2 rotary heads, helical scanning system  
 Luminance: FM azimuth recording  
 Color signal: Converted subcarrier phase shift recording

**Audio Track:** 1 track  
**Tape Format:** Tape width 1/2" (12.7mm), high density tape  
**Tape Speed:** SP mode: 1-5/16 i.p.s. (33.35 mm/s)  
 LP mode: 21/32 i.p.s. (16.67 mm/s)  
 SLP mode: 7/16 i.p.s. (11.12 mm/s)

**Record/Playback Time:** 8 HRS. with 160 min. type tape used in SLP mode  
**FF/REW Time:** Less than 6 min. with 120 min. type tape  
**Heads:** Video: 2 rotary heads  
 Audio/Control: 1 stationary head  
 Erase: 1 full track erase  
 1 audio track erase

**Input Level:** Video: VIDEO IN Jack (RCA type)  
 1.0Vp-p, 75 $\Omega$  unbalanced  
 Audio: AUDIO IN Jack (RCA type)  
 -20dB, 100k $\Omega$  unbalanced  
**TV Tuners:** VHF Input: VHF Ch2-Ch13,  
 75 $\Omega$  unbalanced  
 UHF Input: Ch14-Ch83,  
 300 $\Omega$  balanced

**Output Level:** Video: VIDEO OUT Jack (RCA type)  
 1.0Vp-p, 75 $\Omega$  unbalanced  
 Audio: AUDIO OUT Jack (RCA type)  
 -6dB, 600 $\Omega$  unbalanced  
**RF Modulated:** Ch3/Ch4 switchable,  
 72dB $\mu$ , (Open Voltage)  
 75 $\Omega$  unbalanced

#### Video Horizontal

**Resolution:** Color: more than 230 lines  
 B/W: more than 230 lines

#### Audio Frequency

**Response:** SP mode: 100Hz ~ 8kHz  
 (10dB down) LP mode: 100Hz ~ 6kHz  
 SLP mode: 150Hz ~ 5kHz

**Signal-to-Noise Ratio:** Video: SP mode: better than 40dB  
 LP mode: better than 40dB  
 SLP mode: better than 40dB  
 (Rohde & Schwarz noise meter)  
 Audio: SP mode: better than 42dB  
 LP mode: better than 40dB  
 SLP mode: better than 40dB

#### Operation

**Temperature:** 41°F—104°F (5°C—40°C)  
**Operating Humidity:** 10%—75%  
**Weight:** 17.6 lbs. (8.0kg)  
**Dimensions:** 16-15/16"(W)  $\times$  14-3/8"(D)  $\times$  4-1/2"(H)  
 (430mm  $\times$  365mm  $\times$  115mm)

#### Accessories Supplied:

- Remote control unit
- VHF matching box 75 $\Omega$ —300 $\Omega$  transformer
- 300 $\Omega$ —75 $\Omega$  transformer
- Coaxial cable with one-touch type F Connector
- Twin-lead cable

#### Available Tapes:

1/2" VHS video cassette tapes  
 NV-T160 Approx. 1073ft. (327m), 160,  
 320, or 480 min  
 NV-T120 Approx. 810ft. (247m), 120, 240,  
 or 360 min  
 NV-T60 Approx. 417ft. (127m), 60, 120,  
 or 180 min.

Weight and dimensions shown are approximate. Specifications are subject to change without notice.

**Panasonic®**

Matsushita Engineering & Service Company  
 Division of Matsushita Electric  
 Corporation of America  
 50 Meadowland Parkway, Secaucus,  
 New Jersey 07094

Panasonic Hawaii Inc.  
 91-238 Kauhli St. Ewa Beach  
 P.O. Box 774  
 Honolulu, Hawaii 96808-0774

Matsushita Electric  
 of Canada Limited  
 5770 Ambler Drive, Mississauga,  
 Ontario, L4W 2T3

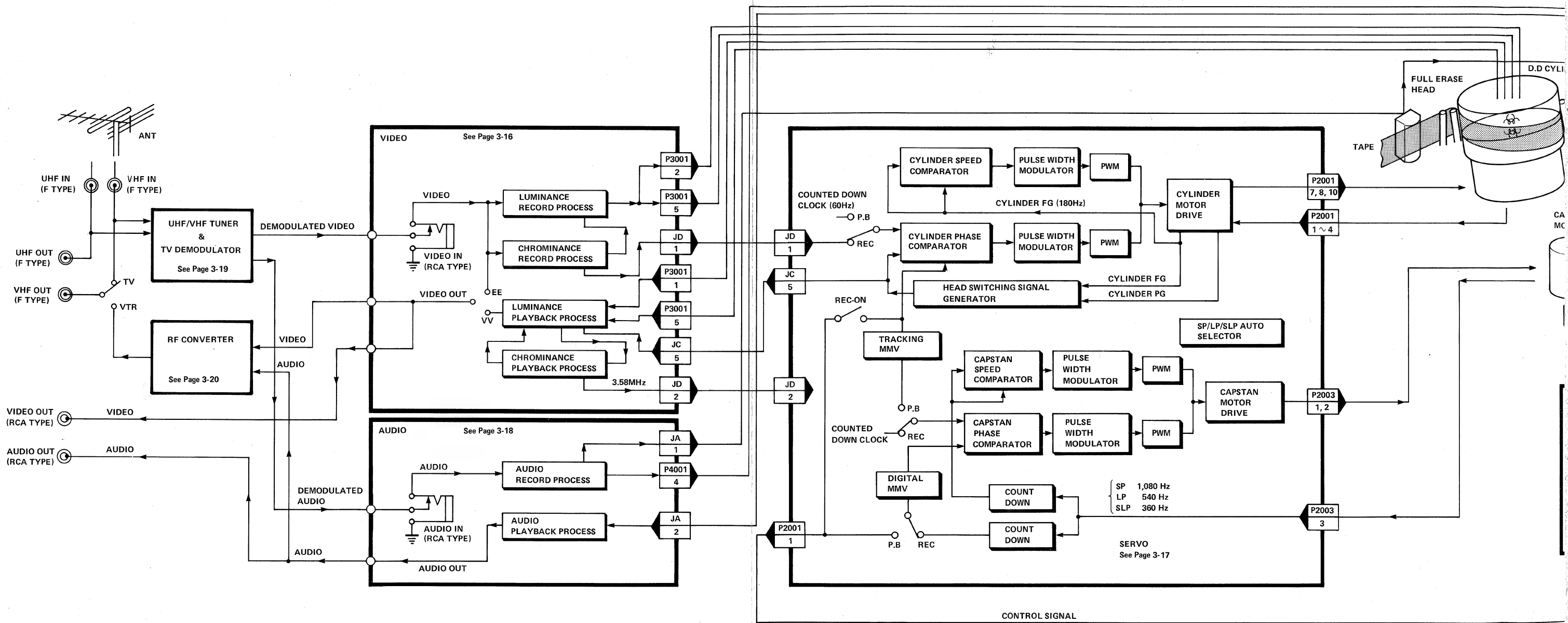
Panasonic Sales Company,  
 Division of Matsushita Electric  
 of Puerto Rico, Inc.  
 Ave. 65 De Infanteria, KM 9.7  
 Victoria Industrial Park  
 Carolina, Puerto Rico 00630

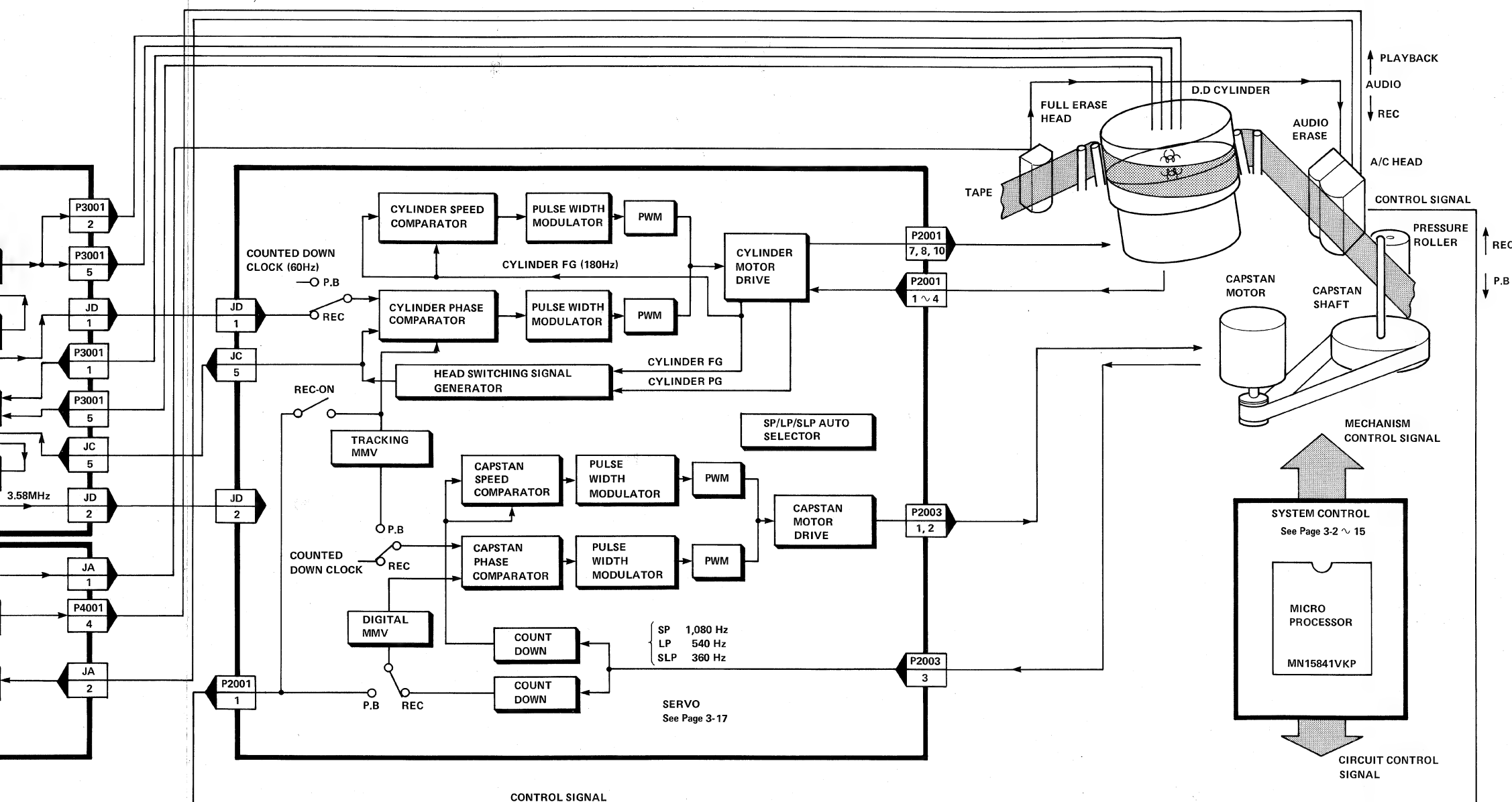
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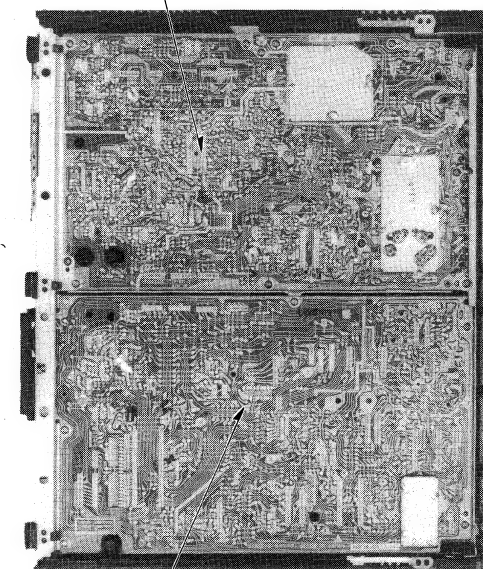


OVERALL BLOCK DIAGRAM





Luminance/Chrominance/Power  
Supply/Timer CTL C.B.A.

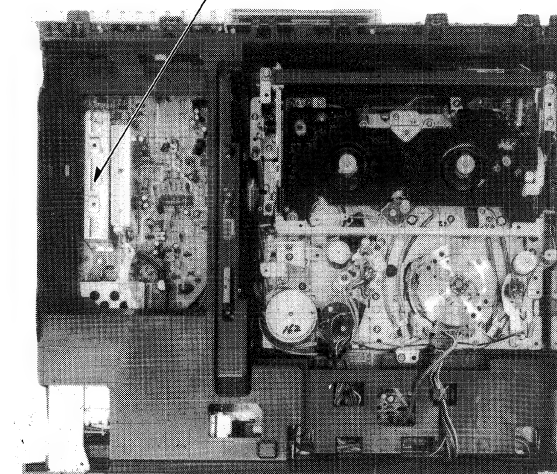


Servo/Audio/System Control  
C.B.A.



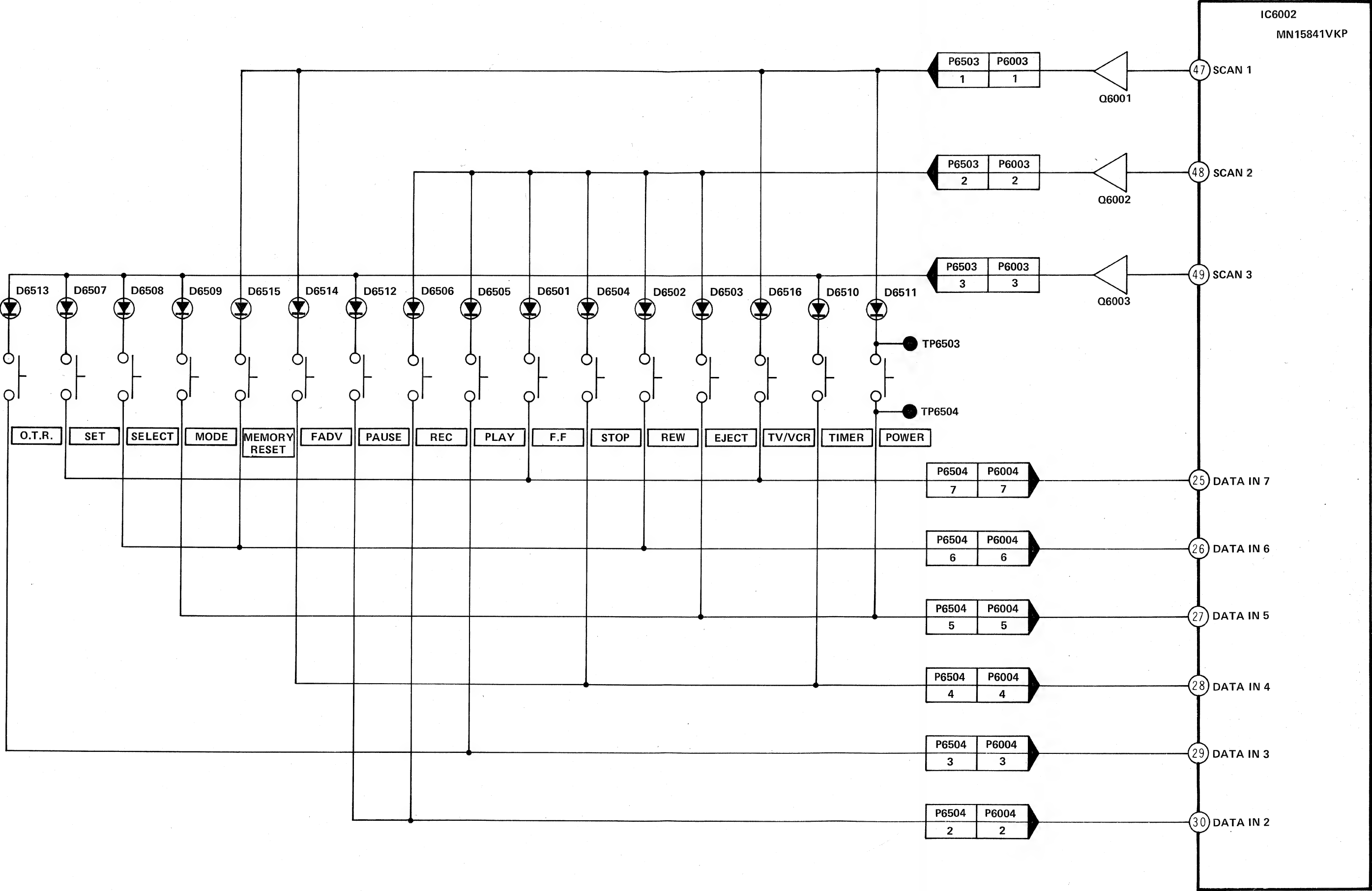
Operation C.B.A.

TV Demodulator Unit



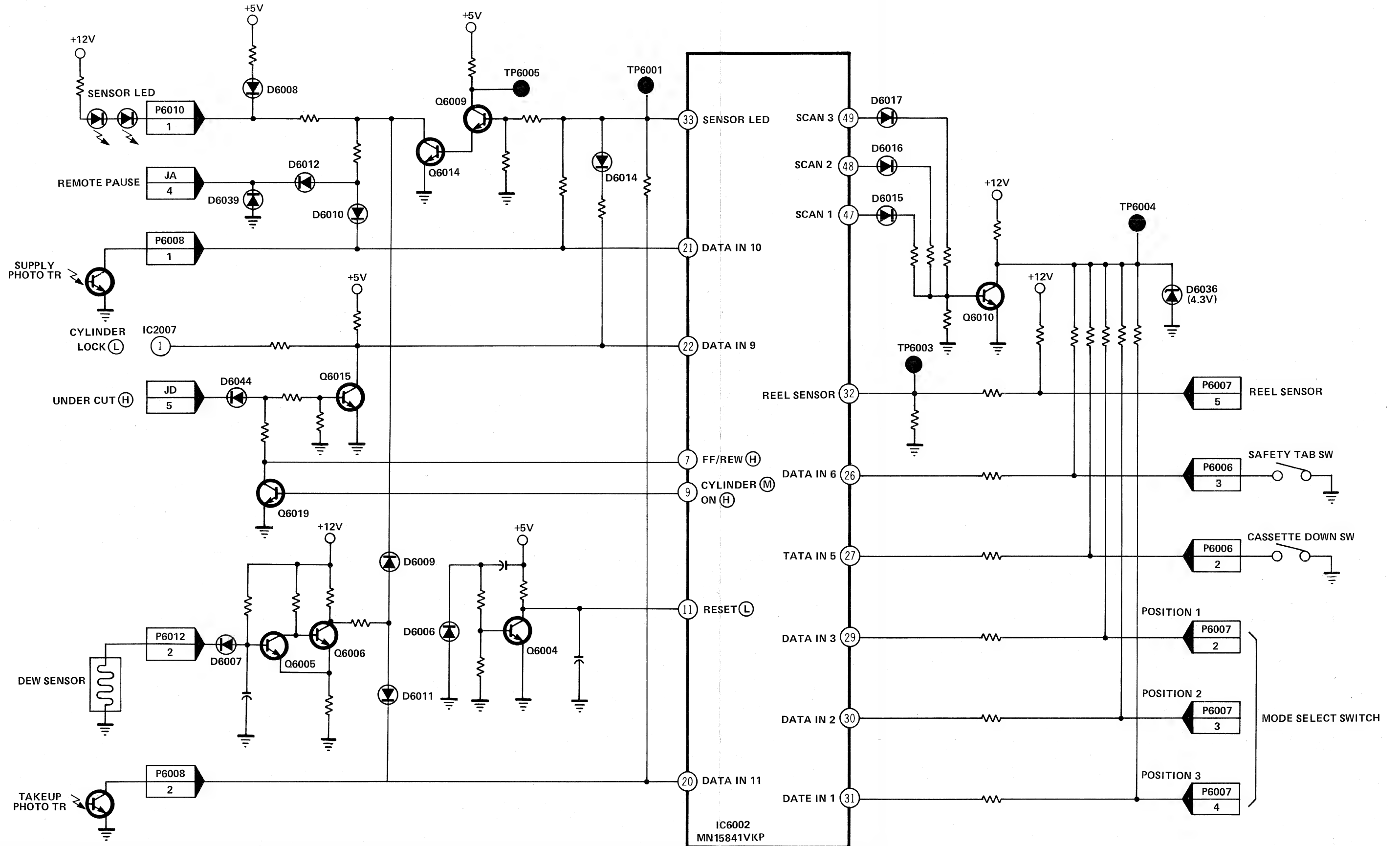


KEY MATRIX BLOCK DIAGRAM (SYSTEM CONTROL)

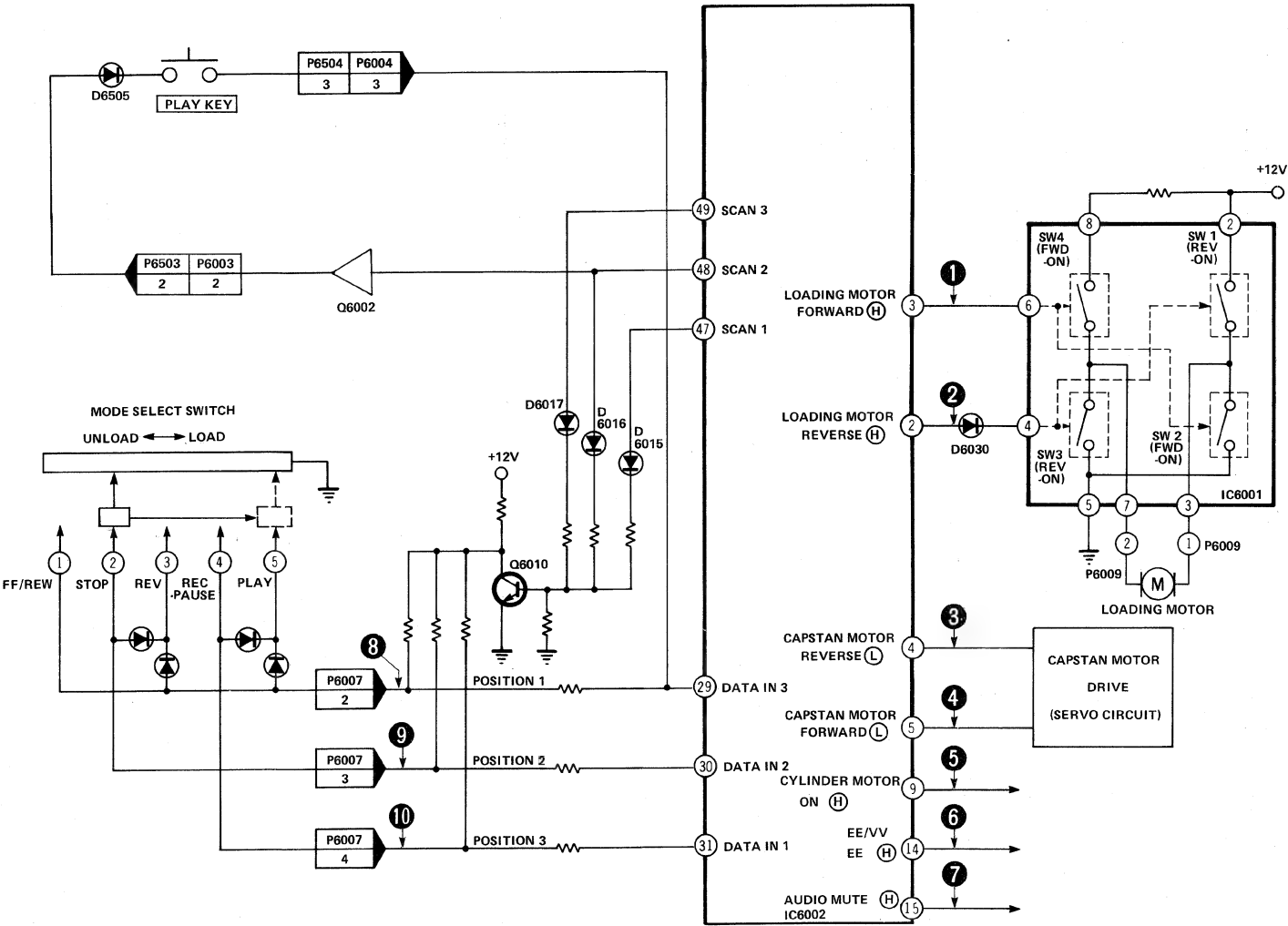


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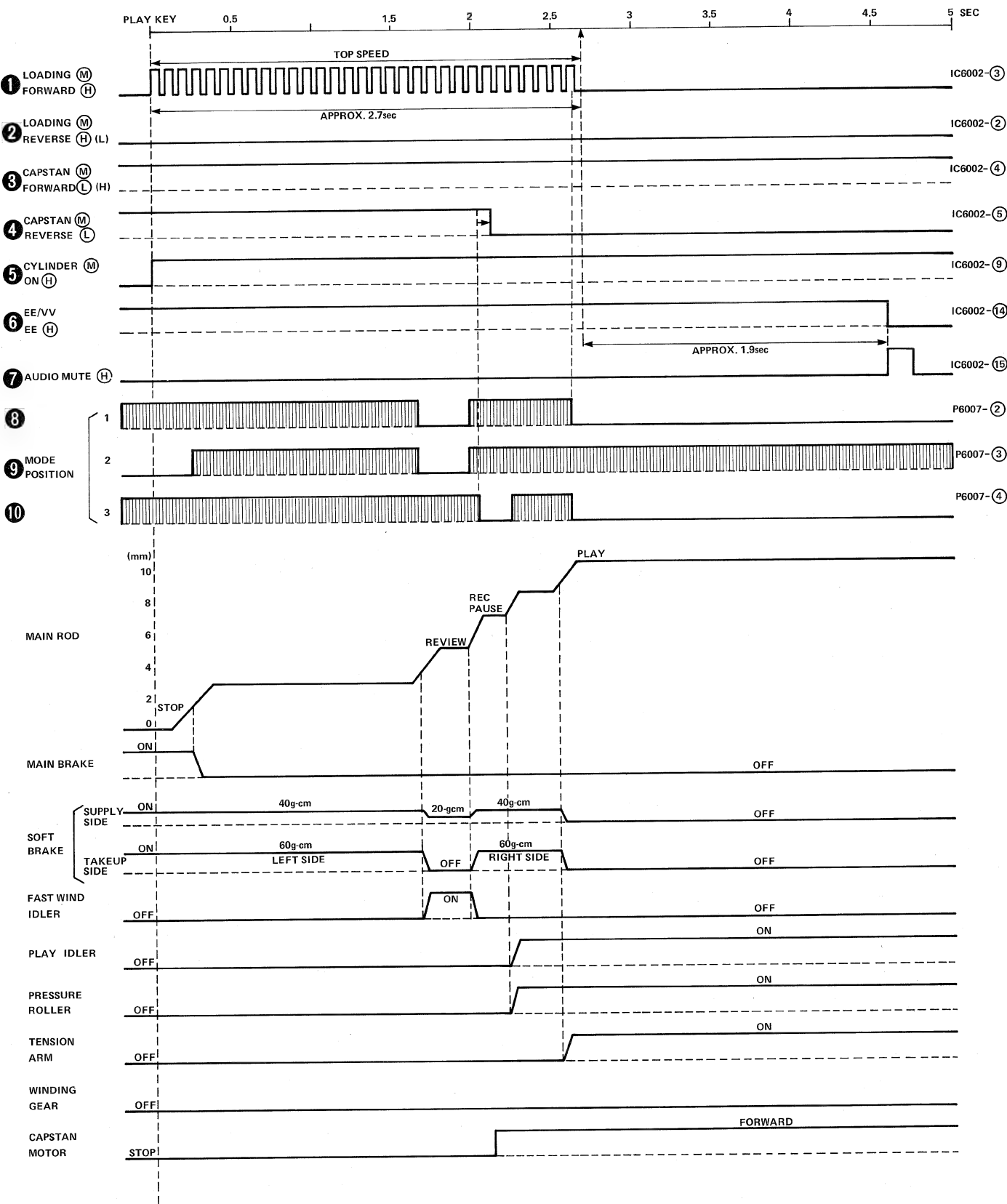
# SAFETY FEATURES BLOCK DIAGRAM (SYSTEM CONTROL)



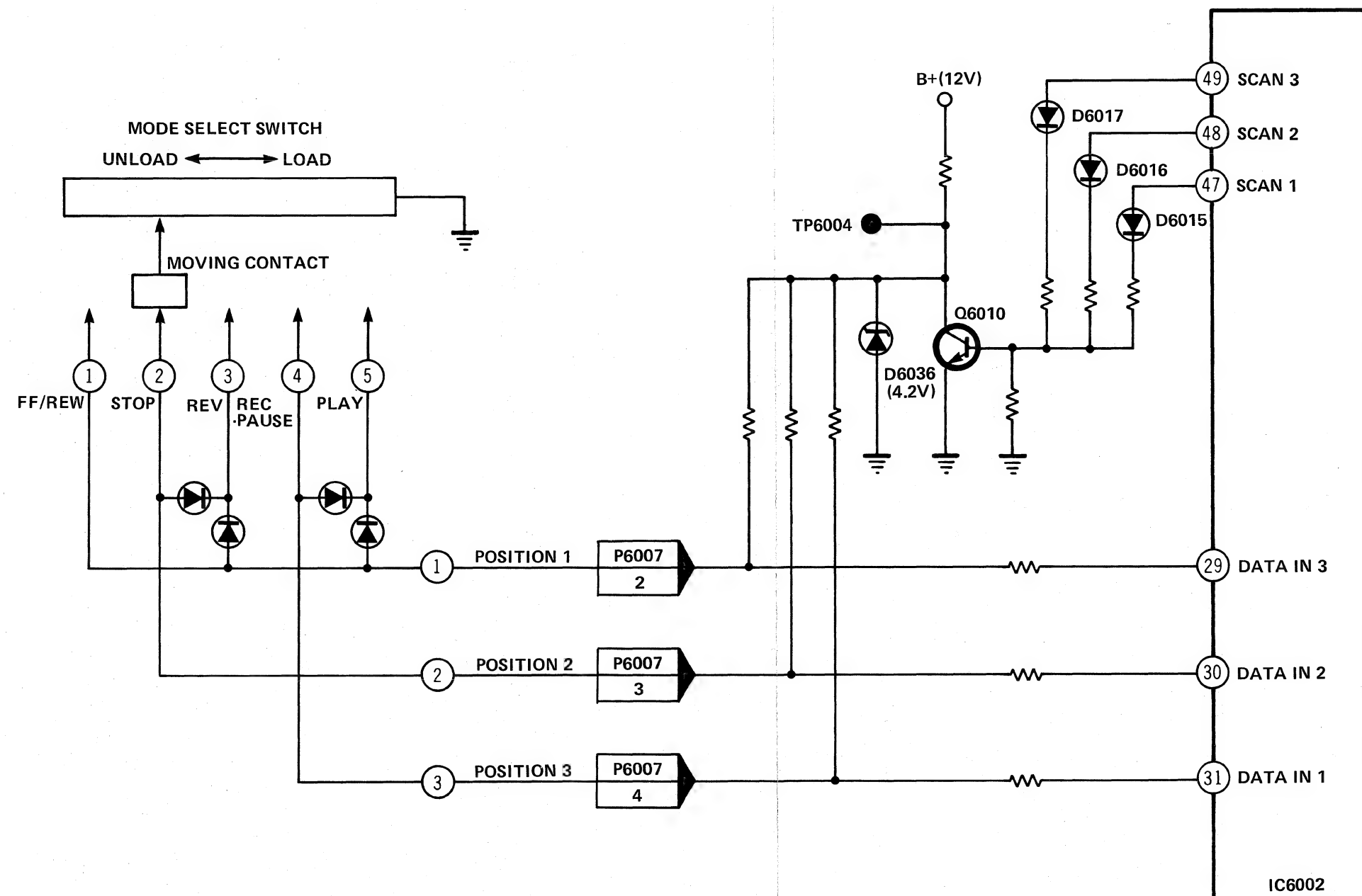
STOP → PLAY BLOCK DIAGRAM (SYSTEM CONTROL)



STOP → PLAY MODE TIMING CHART

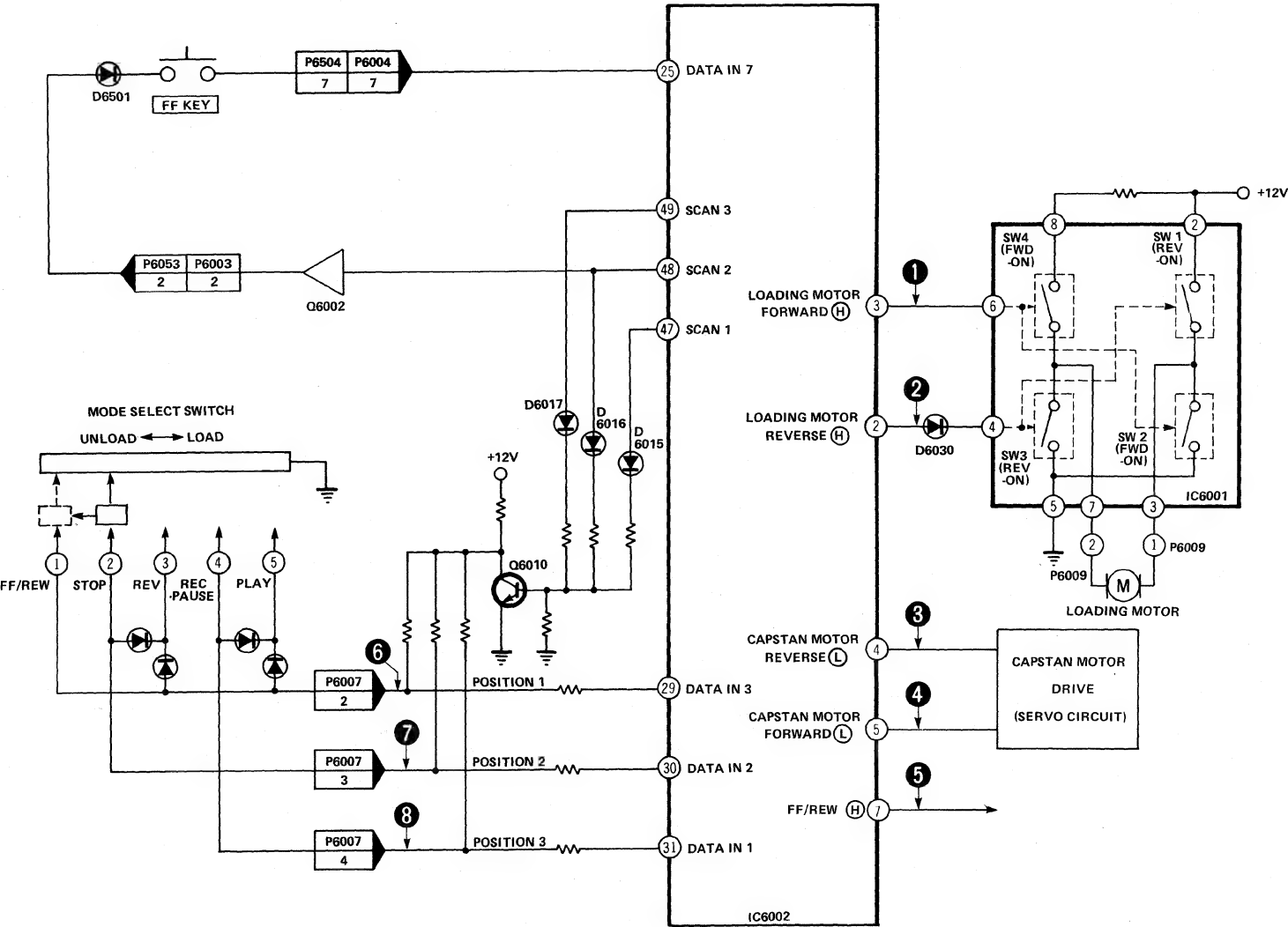


## MODE SELECT SWITCH BLOCK DIAGRAM (SYSTEM CONTROL)

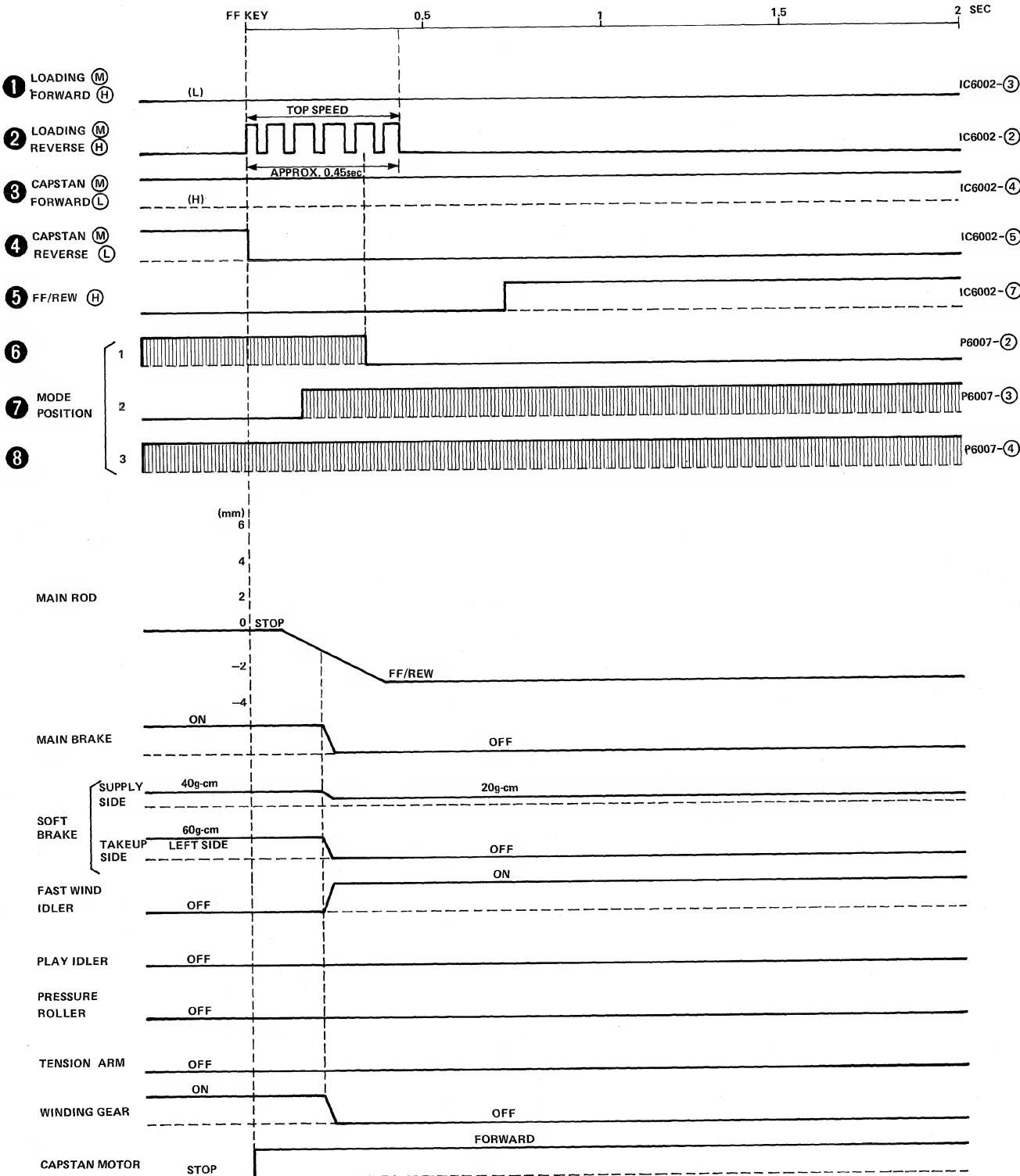




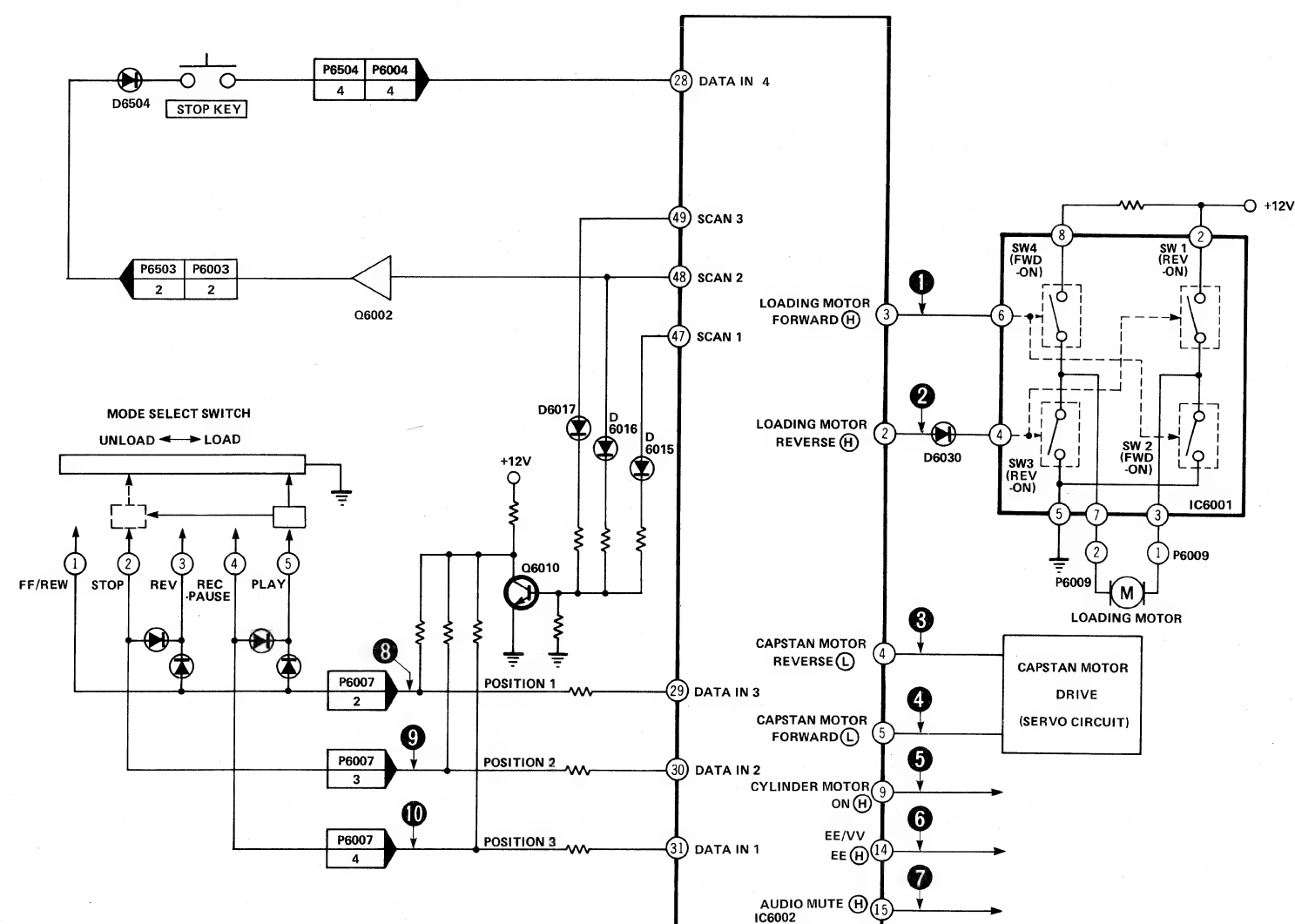
STOP → FF BLOCK DIAGRAM (SYSTEM CONTROL)



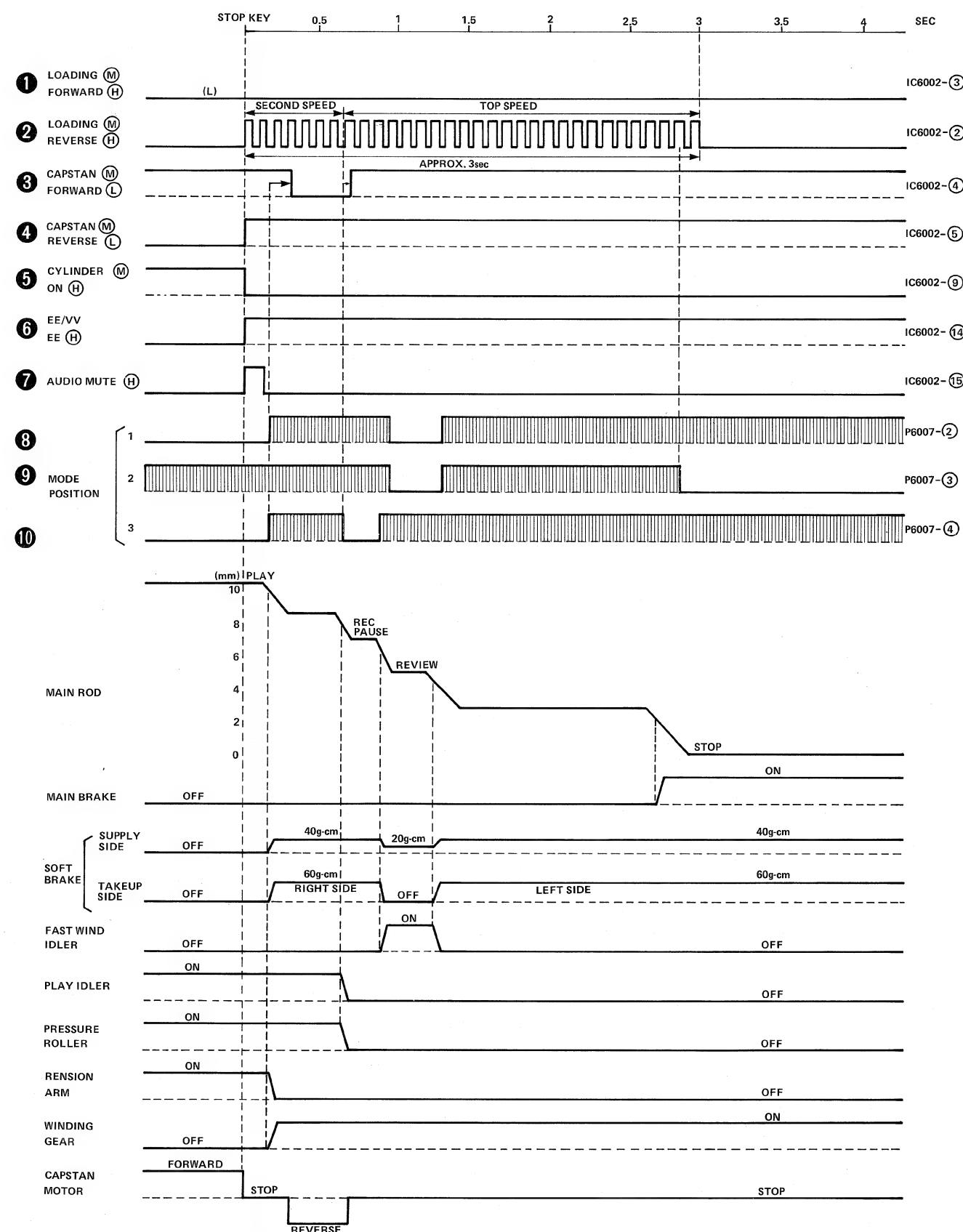
STOP → FF MODE TIMING CHART



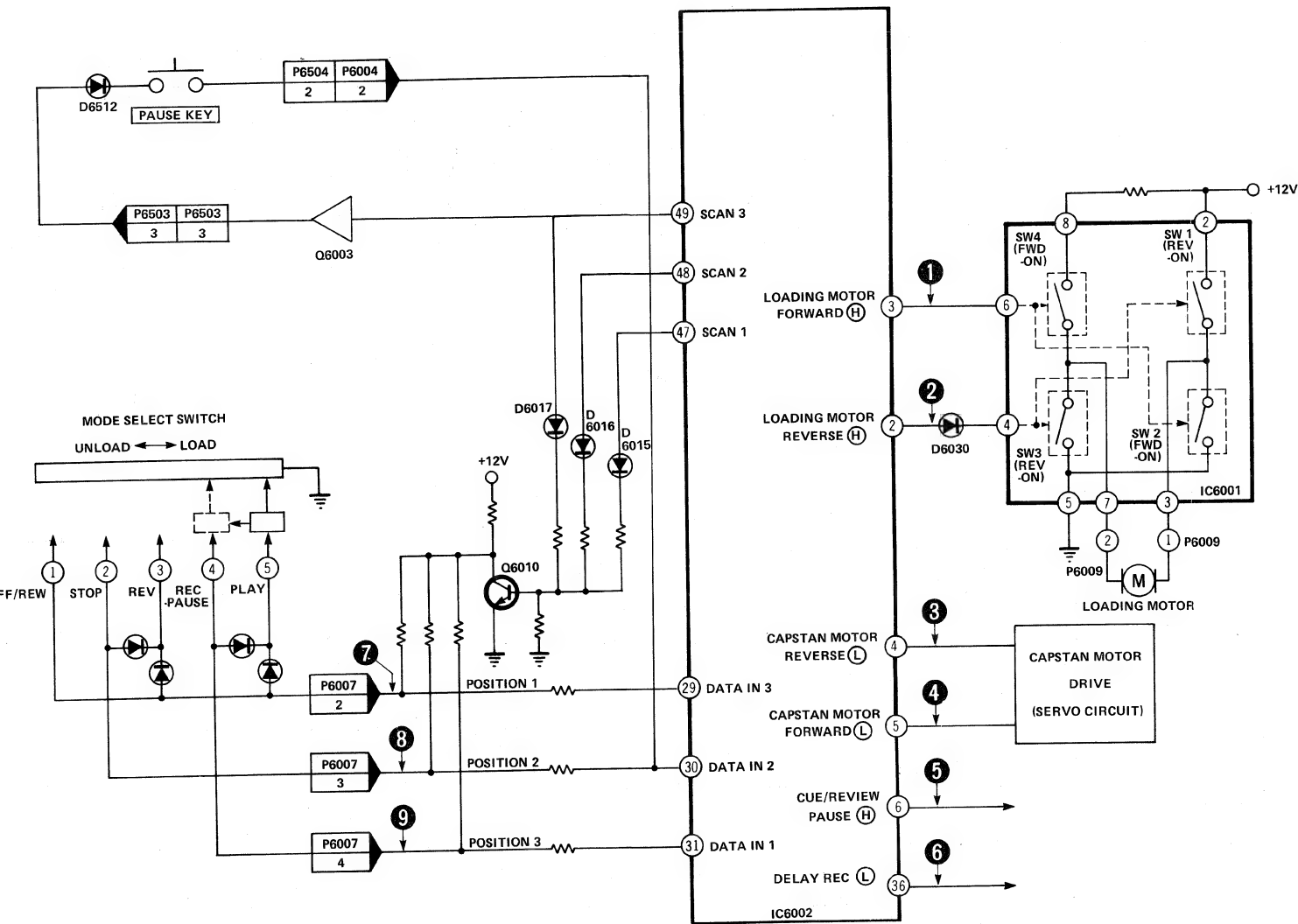
# PLAY → STOP BLOCK DIAGRAM (SYSTEM CONTROL)



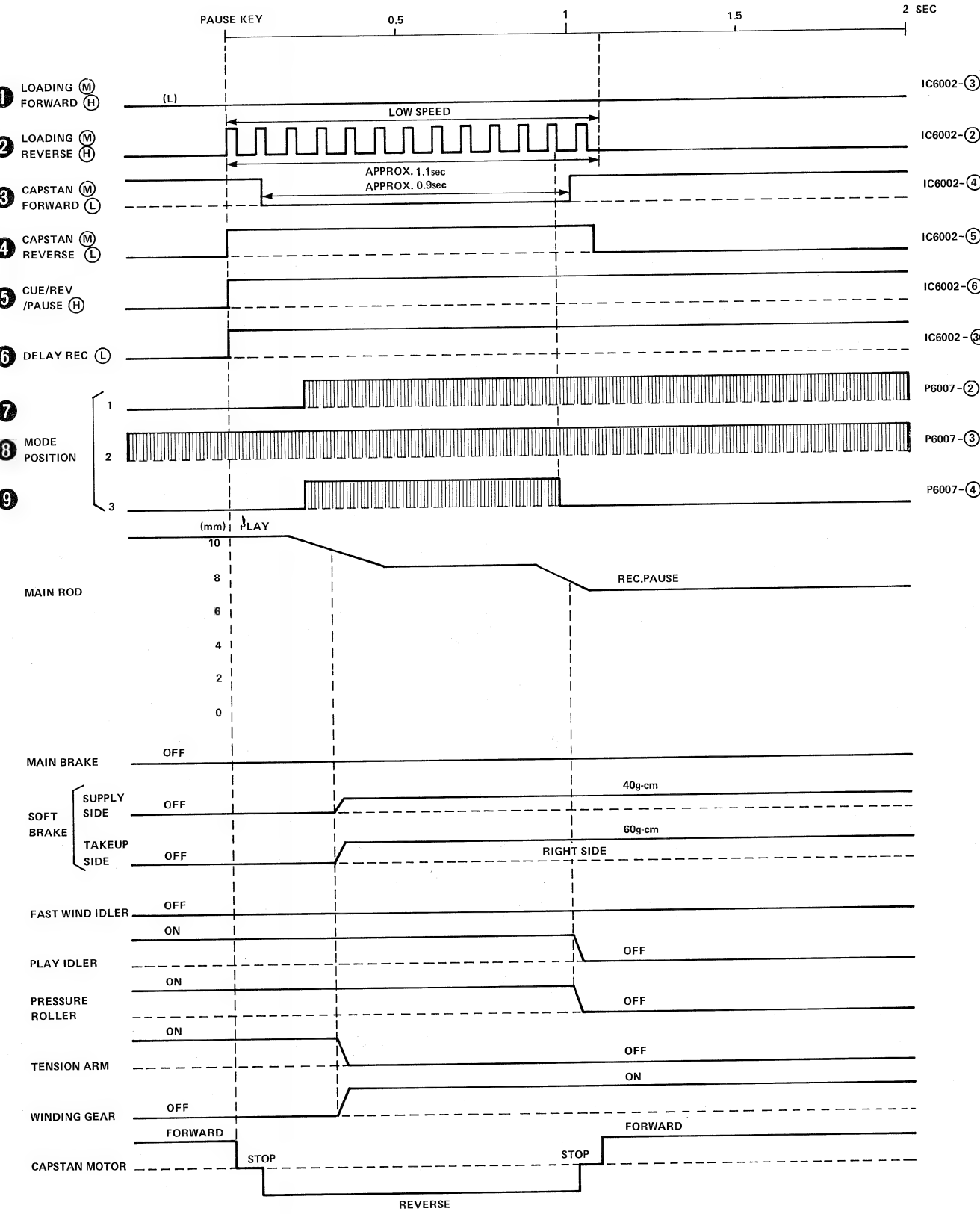
# PLAY → STOP MODE TIMING CHART



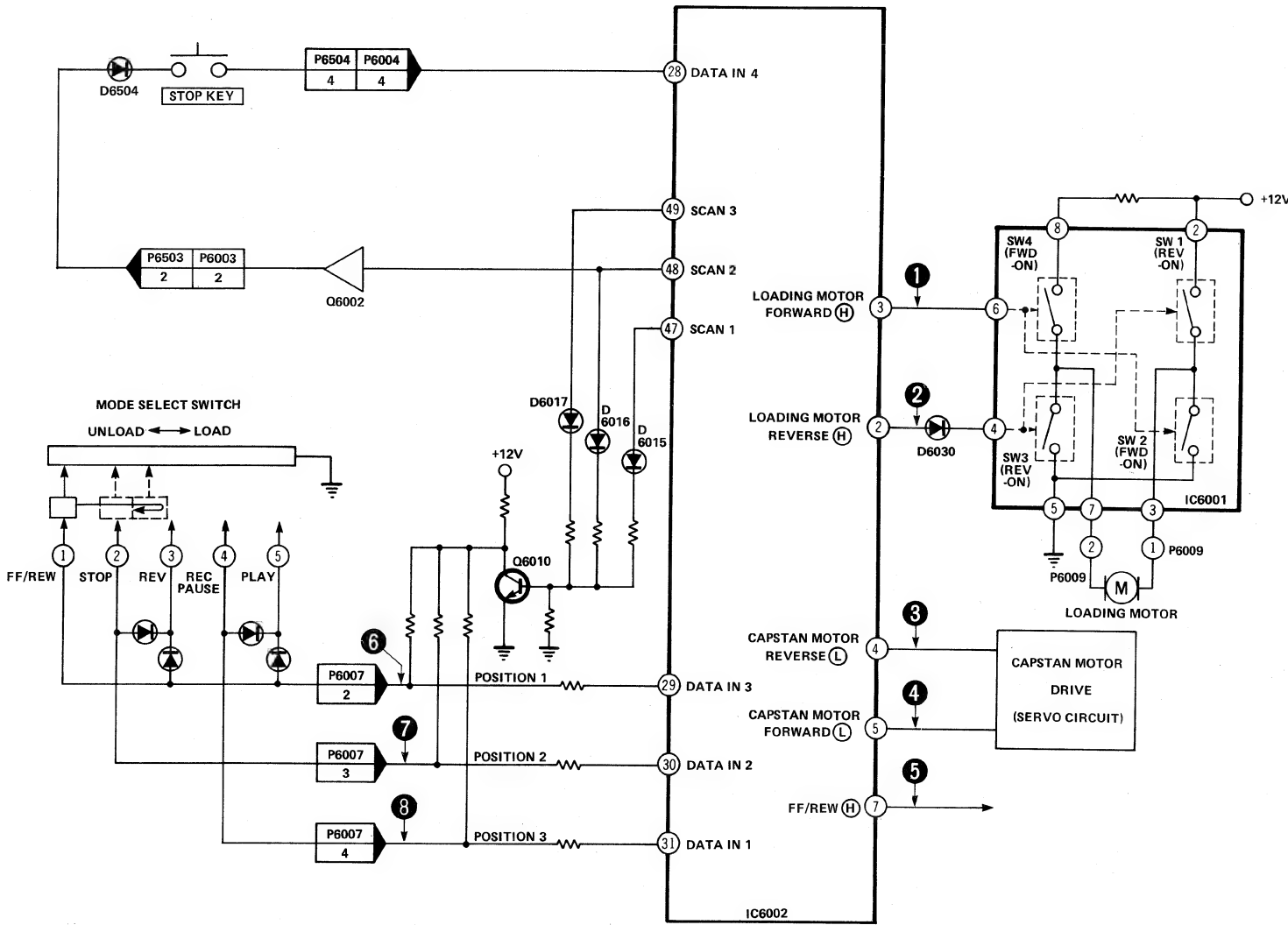
REC•PLAY → REC•PAUSE BLOCK DIAGRAM  
(SYSTEM CONTROL)



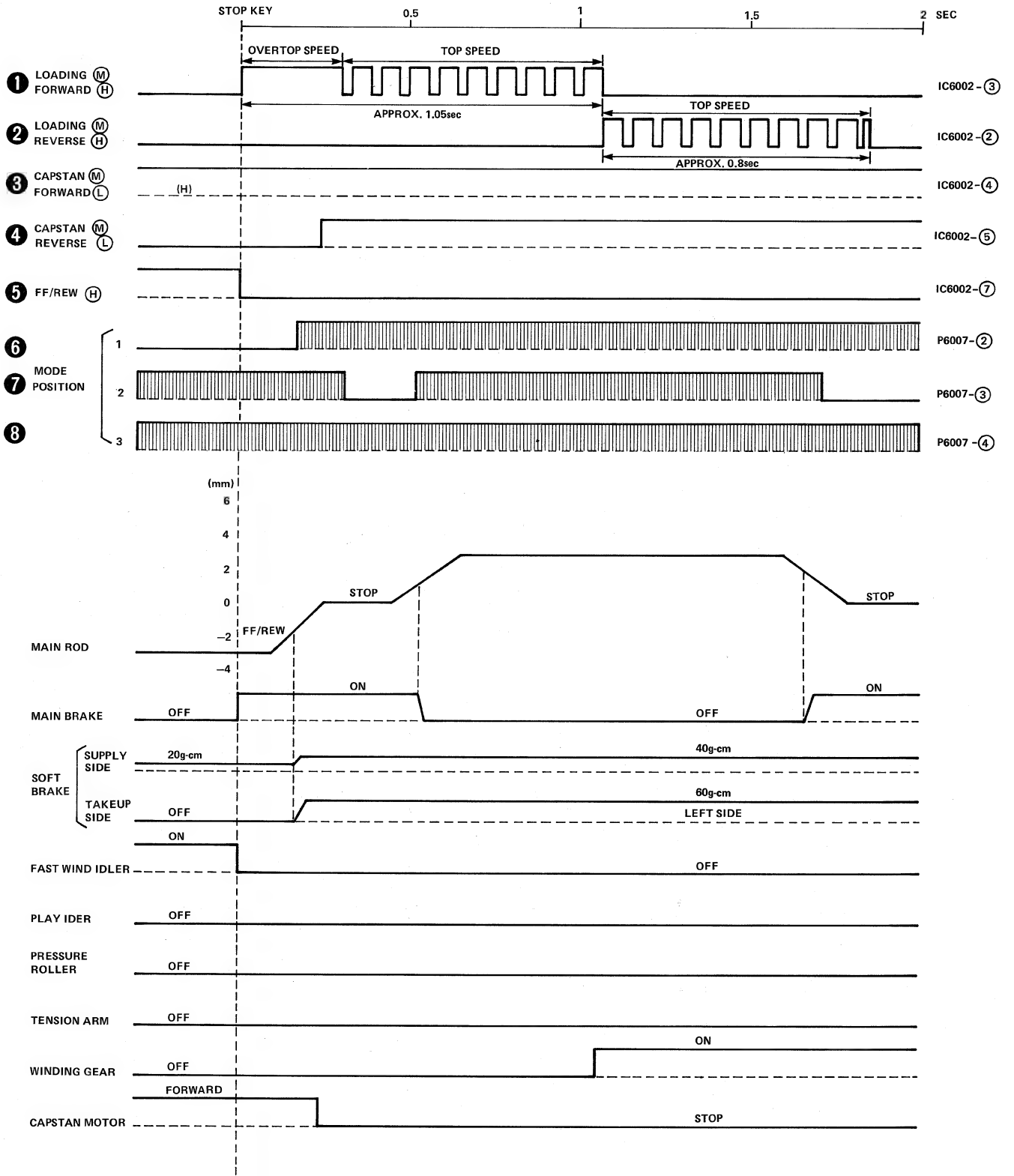
REC•PLAY → REC•PAUSE MODE TIMING CHART



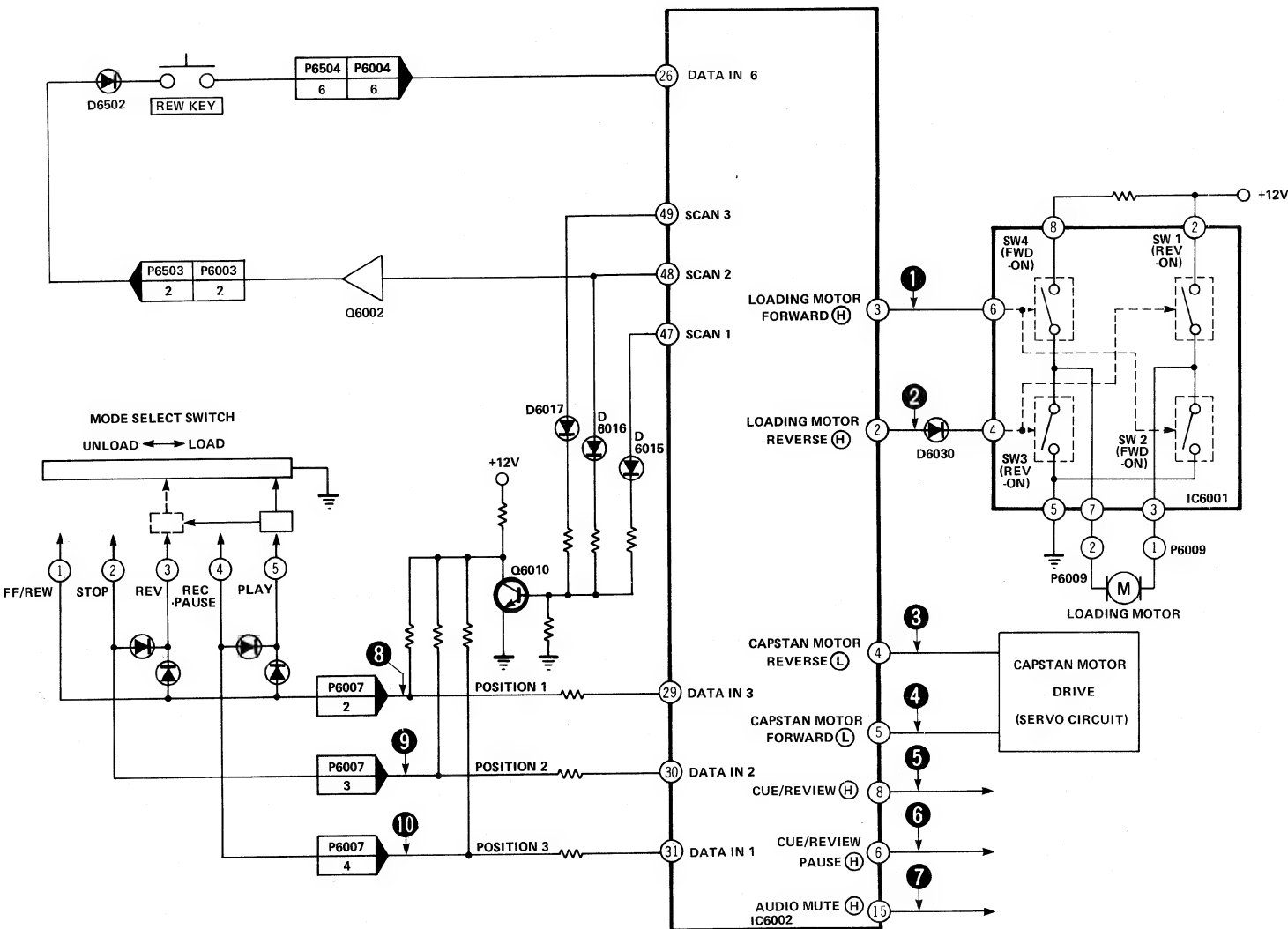
# FF → STOP BLOCK DIAGRAM (SYSTEM CONTROL)



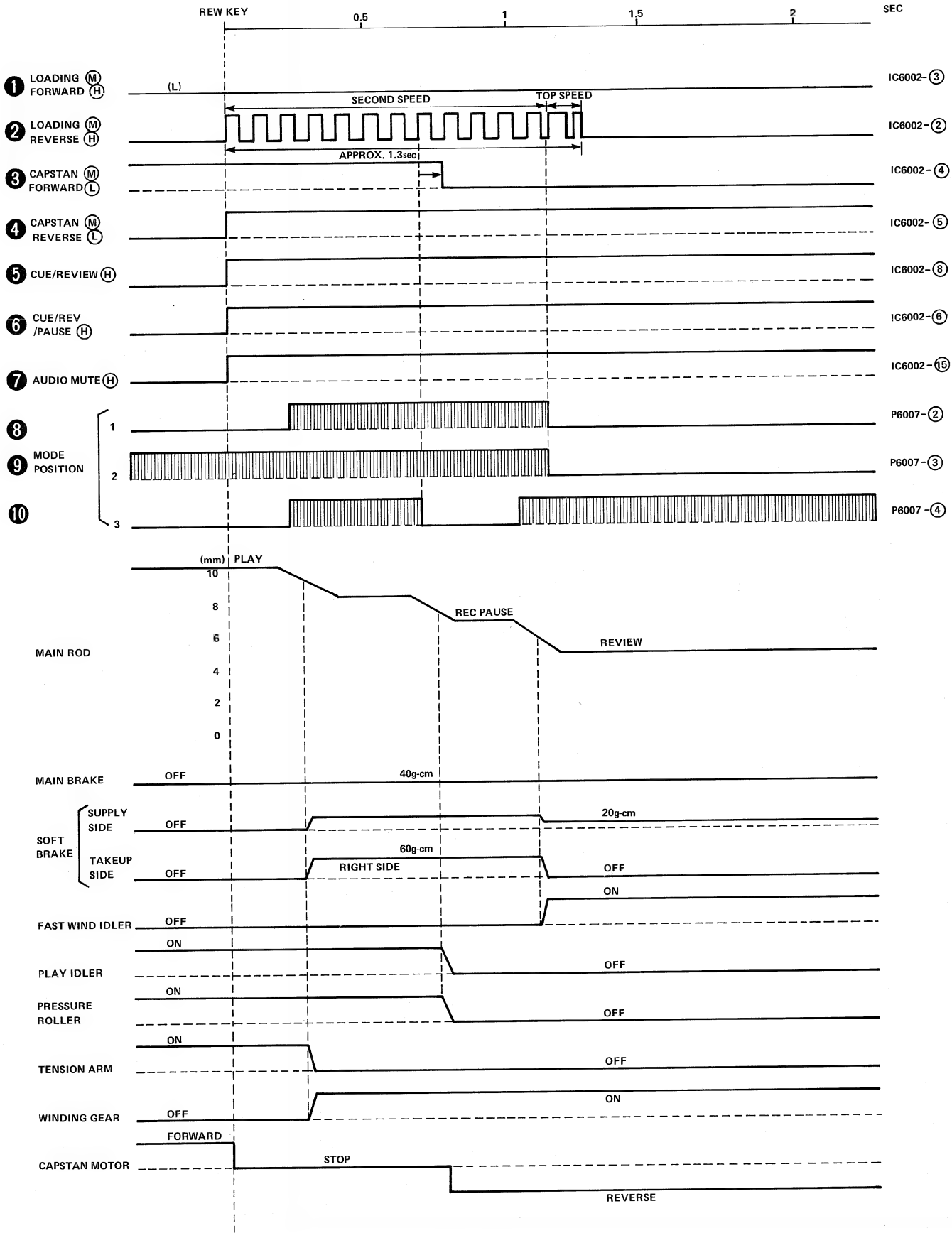
# FF → STOP MODE TIMING CHART



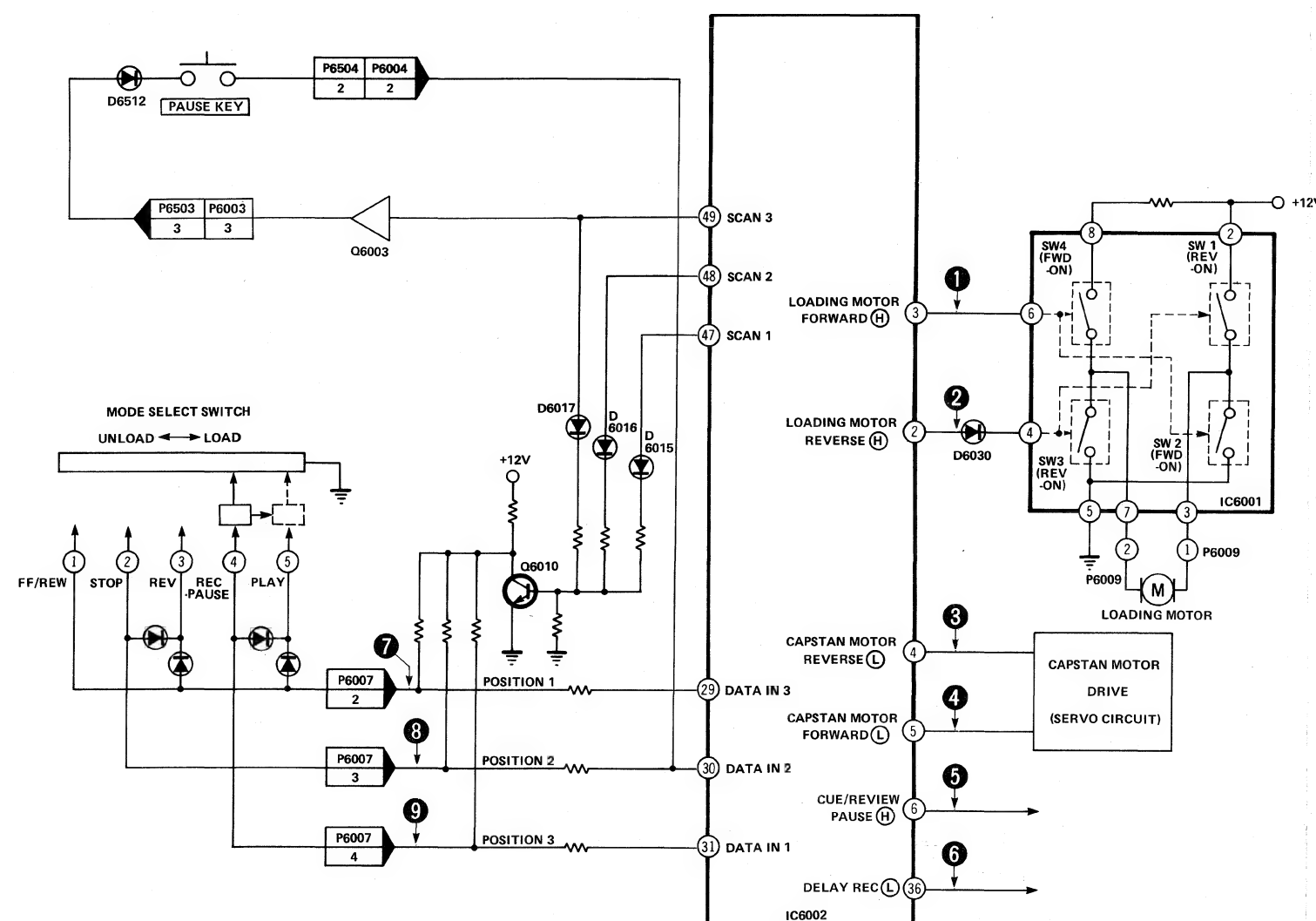
PLAY → REVIEW BLOCK DIAGRAM  
(SYSTEM CONTROL)



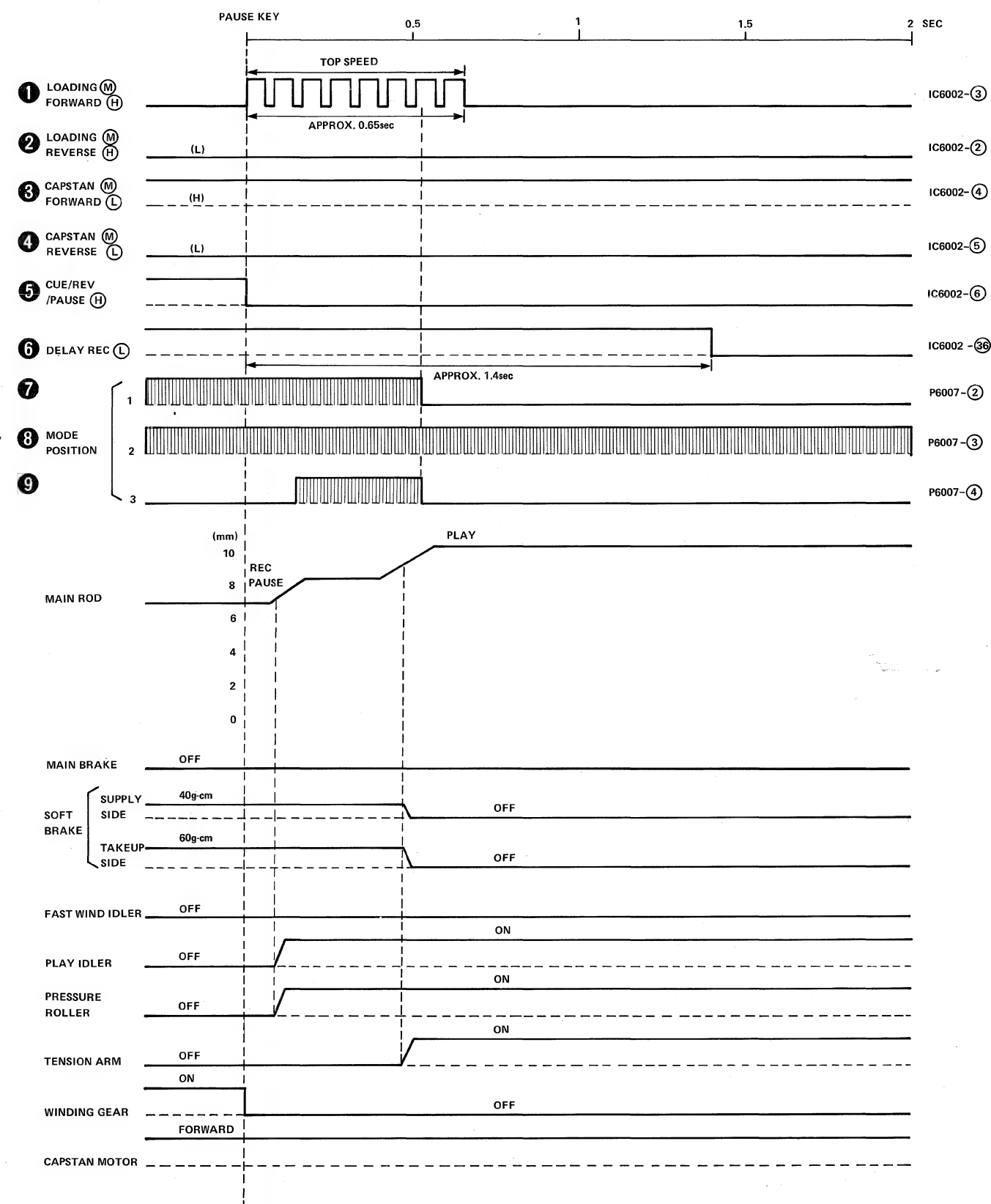
PLAY → REVIEW MODE TIMING CHART



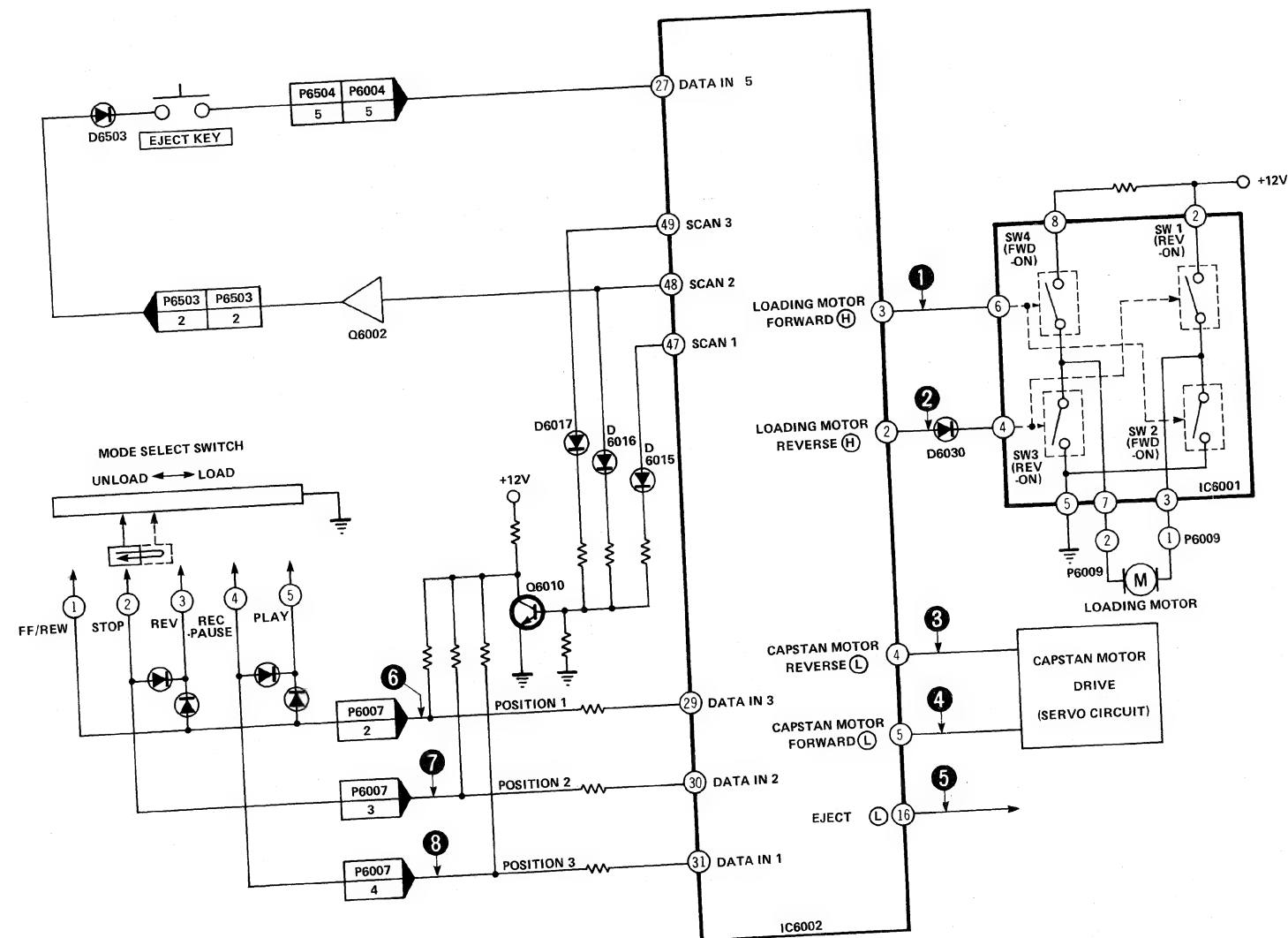
# REC·PAUSE → REC·PLAY BLOCK DIAGRAM (SYSTEM CONTROL)



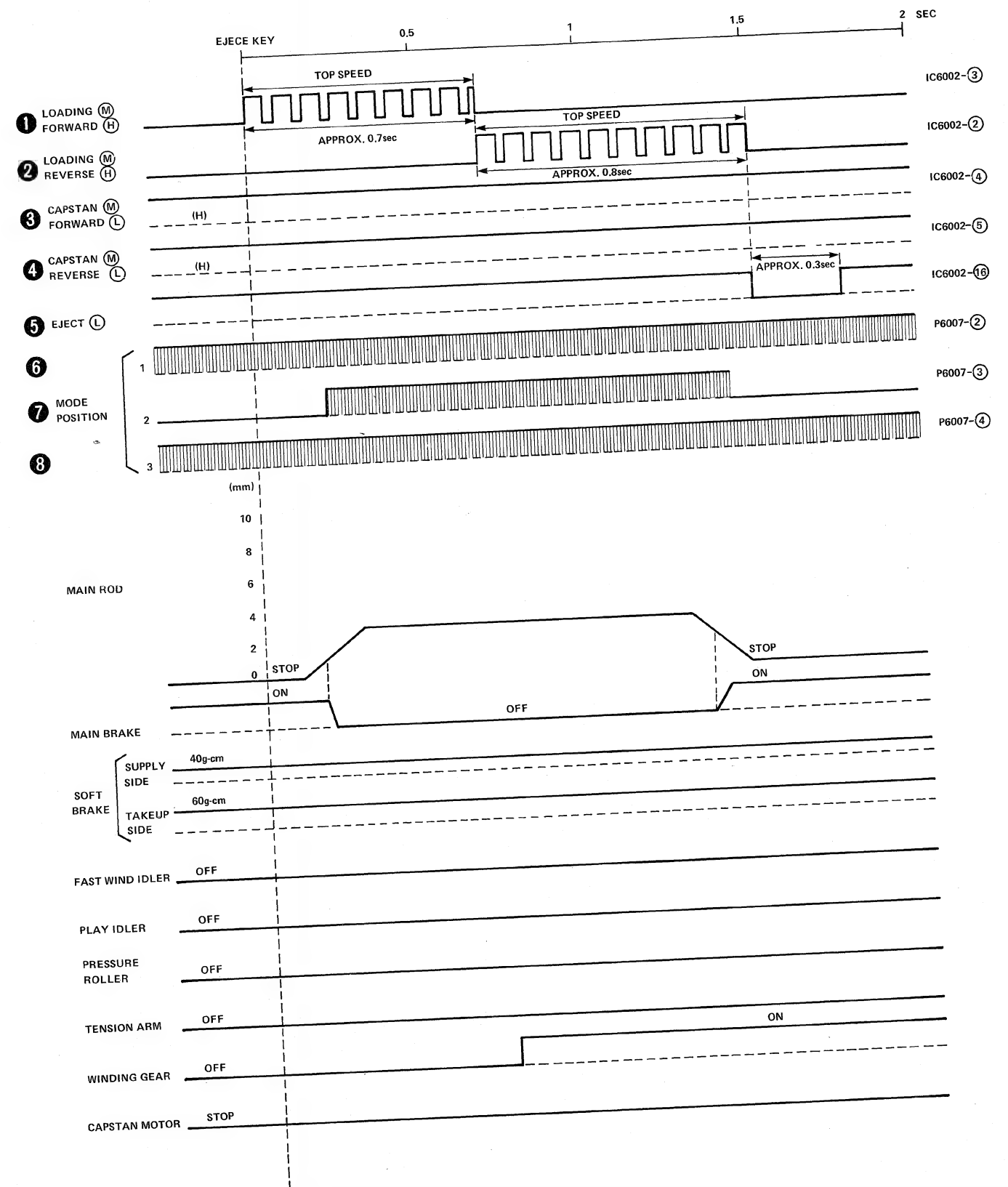
## REC·PAUSE → REC·PLAY MODE TIMING CHART



# STOP → EJECT BLOCK DIAGRAM (SYSTEM CONTROL)

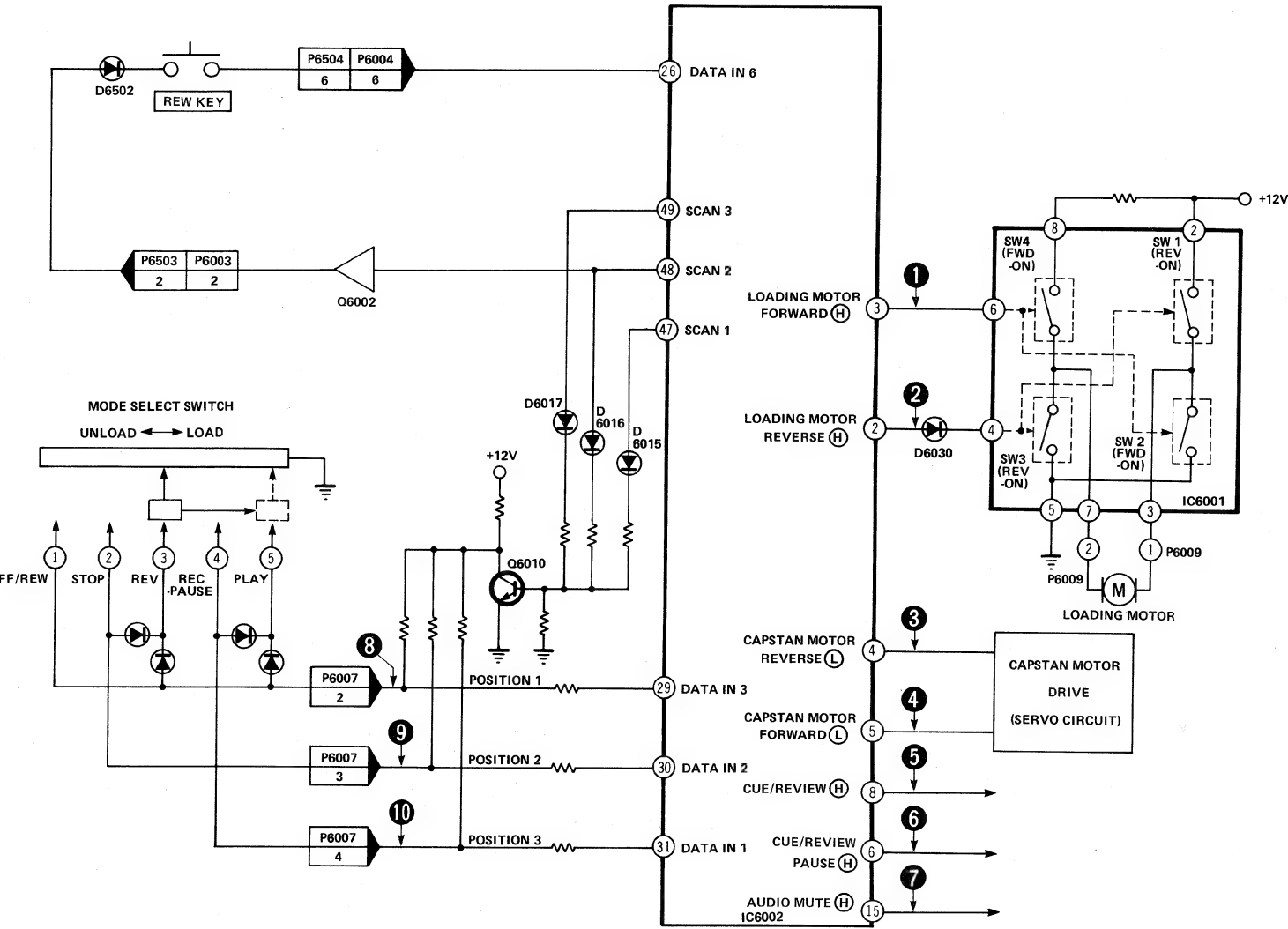


## STOP → EJECT MODE TIMING CHART

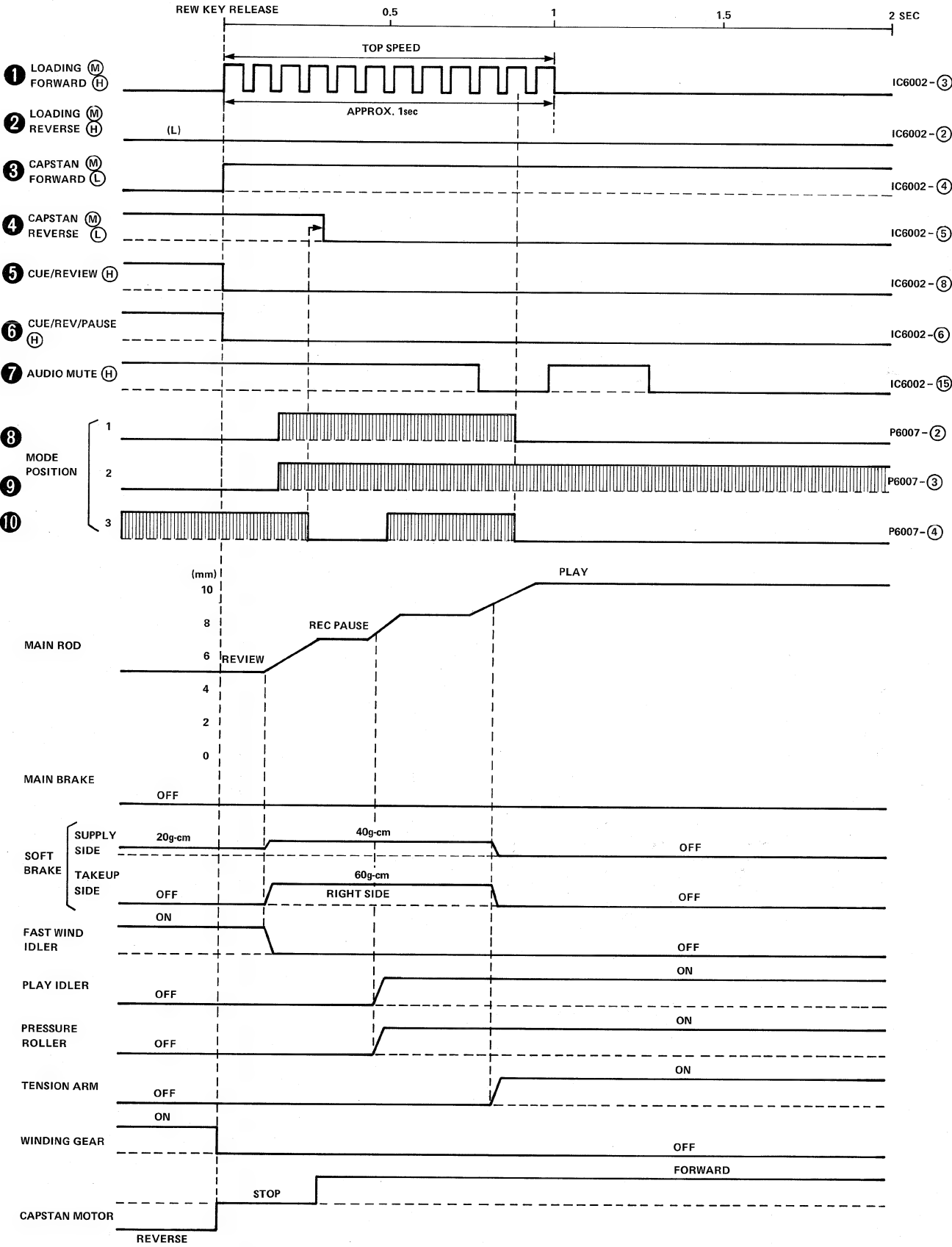




REVIEW → PLAY BLOCK DIAGRAM  
(SYSTEM CONTROL)



REVIEW → PLAY MODE TIMING CHART



MICROPROCESSOR I/O CHART (SYSTEM CONTROL)  
(IC6002: MN1584VKP)

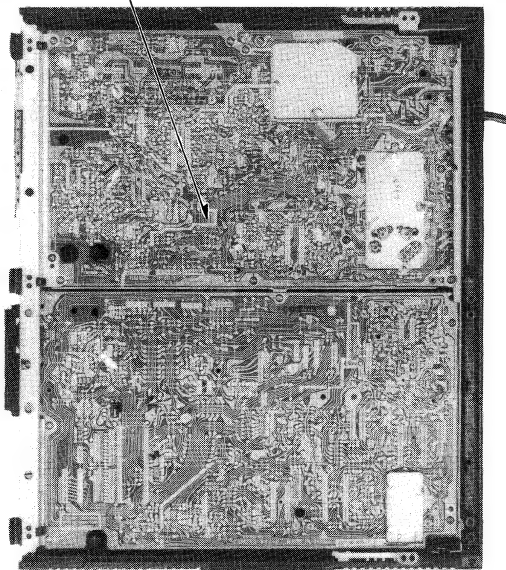
PIN	I/O	NAME/OPERATION		
1	—	GND		
2	OUTPUT	LOADING (M) REVERSE (H)		
3	OUTPUT	LOADING (M) FORWARD (H)		
4	OUTPUT	CAPSTAN (M) REVERSE (L)		
5	OUTPUT	CAPSTAN (M) FORWARD (L)		
6	OUTPUT	CUE/REVIEW/PAUSE (H)		
7	OUTPUT	FF/REW (H)		
8	OUTPUT	REVIEW (H)		
9	OUTPUT	CYLINDER ON (H)		
10	INPUT	SYNC SIGNAL		
11	INPUT	RESET		
12	INPUT	UNDER CUT (L)		
13	INPUT	POWER ON (L)		
14	OUTPUT	EE/VV (EE (H))		
15	OUTPUT	AUDIO MUTE (H)		
16	OUTPUT	EJECT (L)		
17	—	X1 (GND)		
18	—	X0 (OPEN)		
19	INPUT	REF VOLTAGE 1		
20	INPUT	DATA IN 11 (DEW, TAKEUP SENSOR)		
21	INPUT	DATA IN 10 (SUPPLY SENSOR, REMOTE PAUSE)		
22	INPUT	DATA IN 9 (UNDERCUT, CYLINDER LOCK, LED BLOKEN)		
23	INPUT	DATA IN 8 (4 MODE REMOTE CONTROL)		
24	INPUT	REF VOLTAGE 2		
25	INPUT	DATA IN 7	SCAN PULSE	OPERATION
			SCAN 1	TV/VCR KEY
			2	FF KEY
			3	SET KEY
		DATA IN 6	SAFETY TAB	
			SCAN PULSE	OPERATION
			SCAN 1	MEMORY RESET KEY
26	INPUT		2	REW KEY
			3	SELECT KEY

PIN	I/O	NAME/OPERATION		
27	INPUT	DATA IN 5	CASSETTE DOWN	
			SCAN PULSE	OPERATION
			SCAN 1	POWER KEY
			2	EJECT KEY
28	INPUT	DATA IN 4	3	MODE KEY
			SCAN PULSE	OPERATION
			SCAN 1	F ADV KEY
			2	STOP KEY
29	INPUT	DATA IN 3	3	TIMER KEY
			MODE POSITION 1	
			SCAN PULSE	OPERATION
			SCAN 1	SLP
30	INPUT	DATA IN 2	2	PLAY KEY
			3	O. T. R. KEY
			MODE POSITION 2	
			SCAN PULSE	OPERATION
31	INPUT	DATA IN 1	SCAN 1	LP/SLP
			2	REC KEY
			3	PAUSE KEY
			MODE POSITION 3	
32	INPUT		SCAN 1	MEMORY STOP ON
			2	
			3	SERVICE
33	OUTPUT	REEL SENSOR		
34	OUTPUT	SENSOR LED		
35	OUTPUT	TV/VCR (TV (H))		
36	OUTPUT	EXCEPT REC (H)		
37	OUTPUT	DELAY REC (L)		
38	OUTPUT	GRID 1G		
39	OUTPUT	GRID 2G		
40	OUTPUT	GRID 3G		
		GRID 4G		

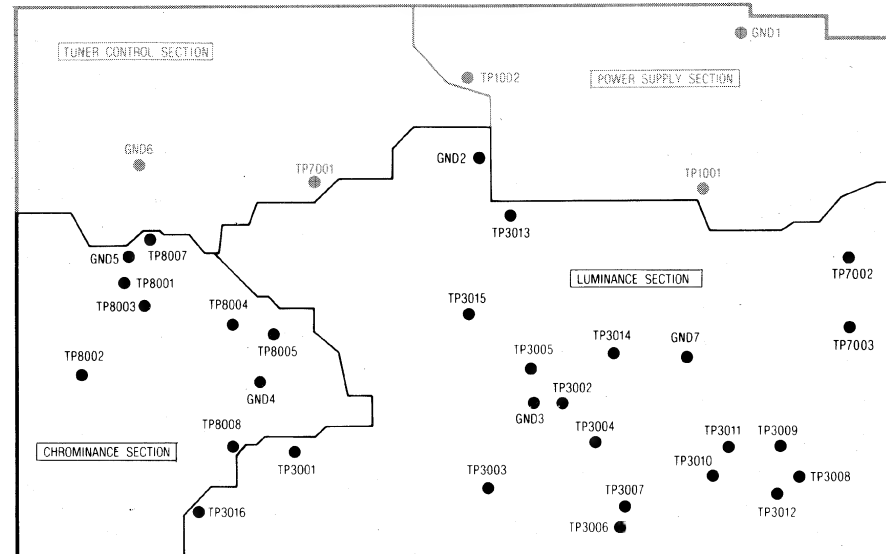
	I/O	NAME/OPERATION	
INPUT	DATA IN 5	CASSETTE DOWN	
		SCAN PULSE	OPERATION
		SCAN 1	POWER KEY
		2	EJECT KEY
INPUT	DATA IN 4	3	MODE KEY
		SCAN PULSE	OPERATION
		SCAN 1	F ADV KEY
		2	STOP KEY
INPUT	DATA IN 3	3	TIMER KEY
		MODE POSITION 1	
		SCAN PULSE	OPERATION
		SCAN 1	SLP
INPUT	DATA IN 2	2	PLAY KEY
		3	O. T. R. KEY
		MODE POSITION 2	
		SCAN PULSE	OPERATION
INPUT	DATA IN 1	SCAN 1	LP/SLP
		2	REC KEY
		3	PAUSE KEY
		MODE POSITION 3	
INPUT	DATA IN 1	SCAN PULSE	OPERATION
		SCAN 1	MEMORY STOP ON
		2	
		3	SERVICE
INPUT	REEL SENSOR		
OUTPUT	SENSOR LED		
OUTPUT	TV/VCR (TV (H) )		
OUTPUT	EXCEPT REC (H)		
OUTPUT	DELAY REC (L)		
OUTPUT	GRID 1G		
OUTPUT	GRID 2G		
OUTPUT	GRID 3G		
OUTPUT	GRID 4G		

PIN	I/O	NAME/OPERATION	
41	OUTPUT	GRID 5G	DISPLAY DRIVE
42	OUTPUT	GRID 6G	
43	OUTPUT	GRID 7G	
44	OUTPUT	GRID 8G	
45	OUTPUT	GRID 9G	
46	OUTPUT	GRID 10G	
47	OUTPUT	GRID 11G/SCAN 1	
48	OUTPUT	GRID 12G/SCAN 2	
49	OUTPUT	GRID 13G/SCAN 3	
50	OUTPUT	GRID 14G	
51	OUTPUT	GRID 15G	
52	OUTPUT	SEGMENT h	
53	OUTPUT	SEGMENT i	
54	OUTPUT	SEGMENT g	
55	OUTPUT	SEGMENT f	
56	OUTPUT	SEGMENT e	
57	OUTPUT	SEGMENT d	
58	OUTPUT	SEGMENT c	
59	OUTPUT	SEGMENT b	
60	OUTPUT	SEGMENT a	
61	INPUT	Vpp	
62	INPUT	OSC 2	
63	INPUT	OSC 1	
64	INPUT	VDD	

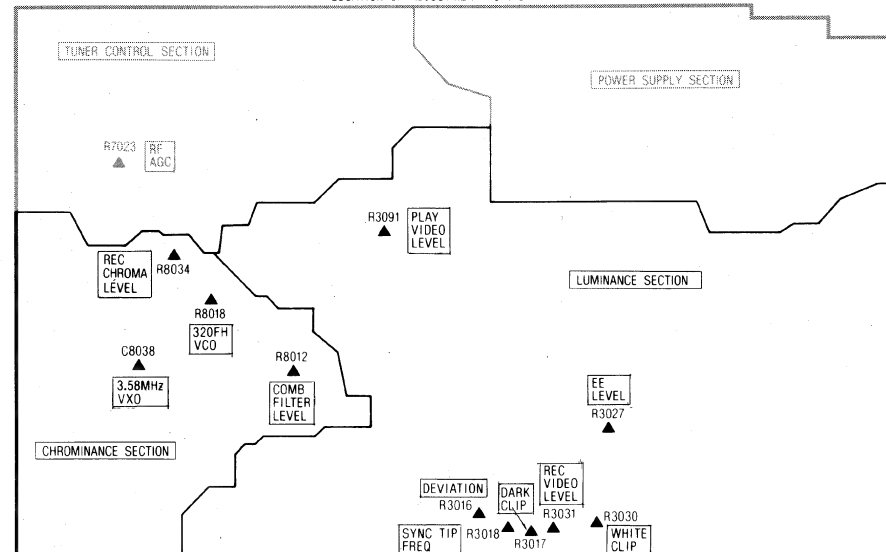
Luminance & Chrominance Section  
(Luminance/Chrominance/Power  
Supply/Timer CTL C.B.A.)



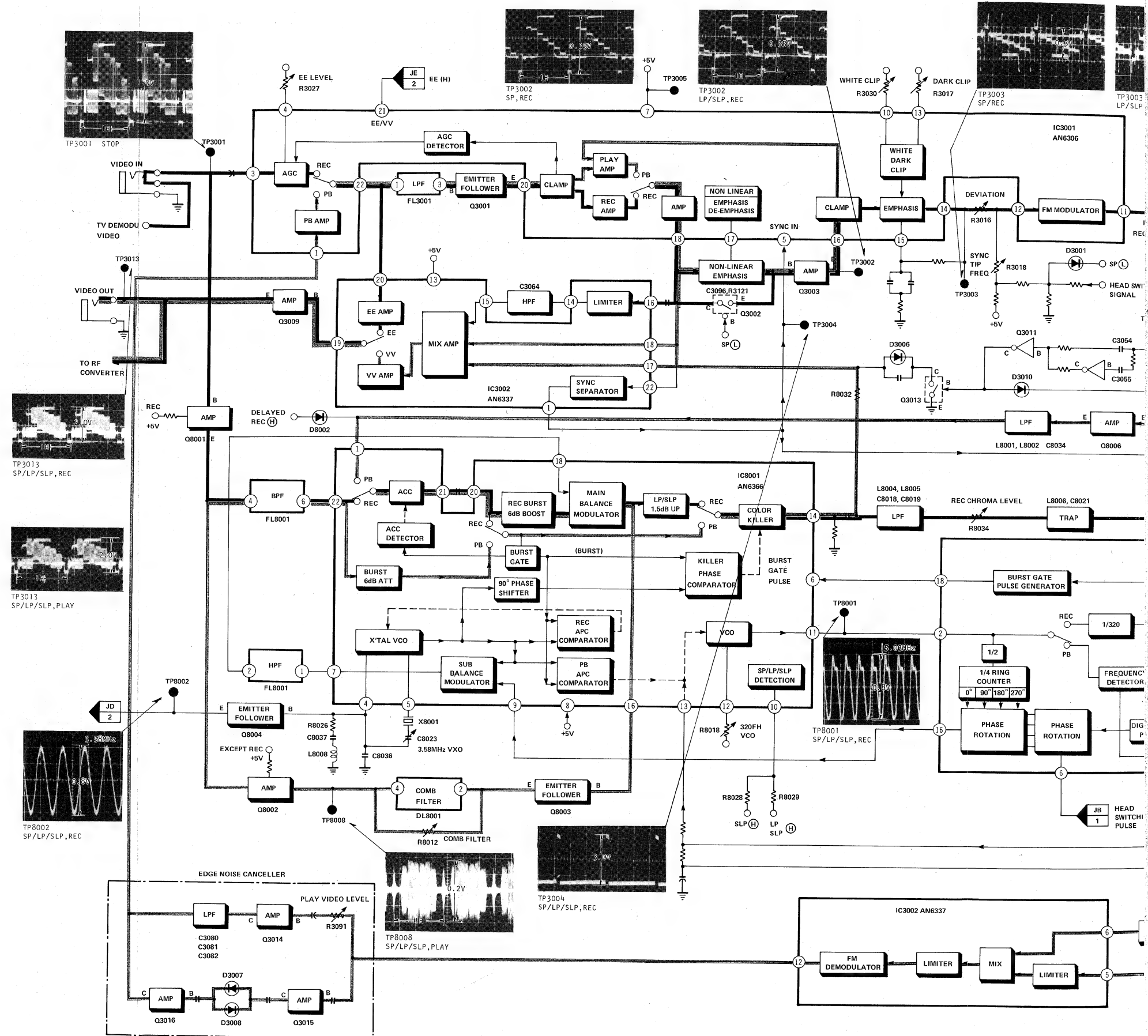
LOCATION OF TEST POINTS



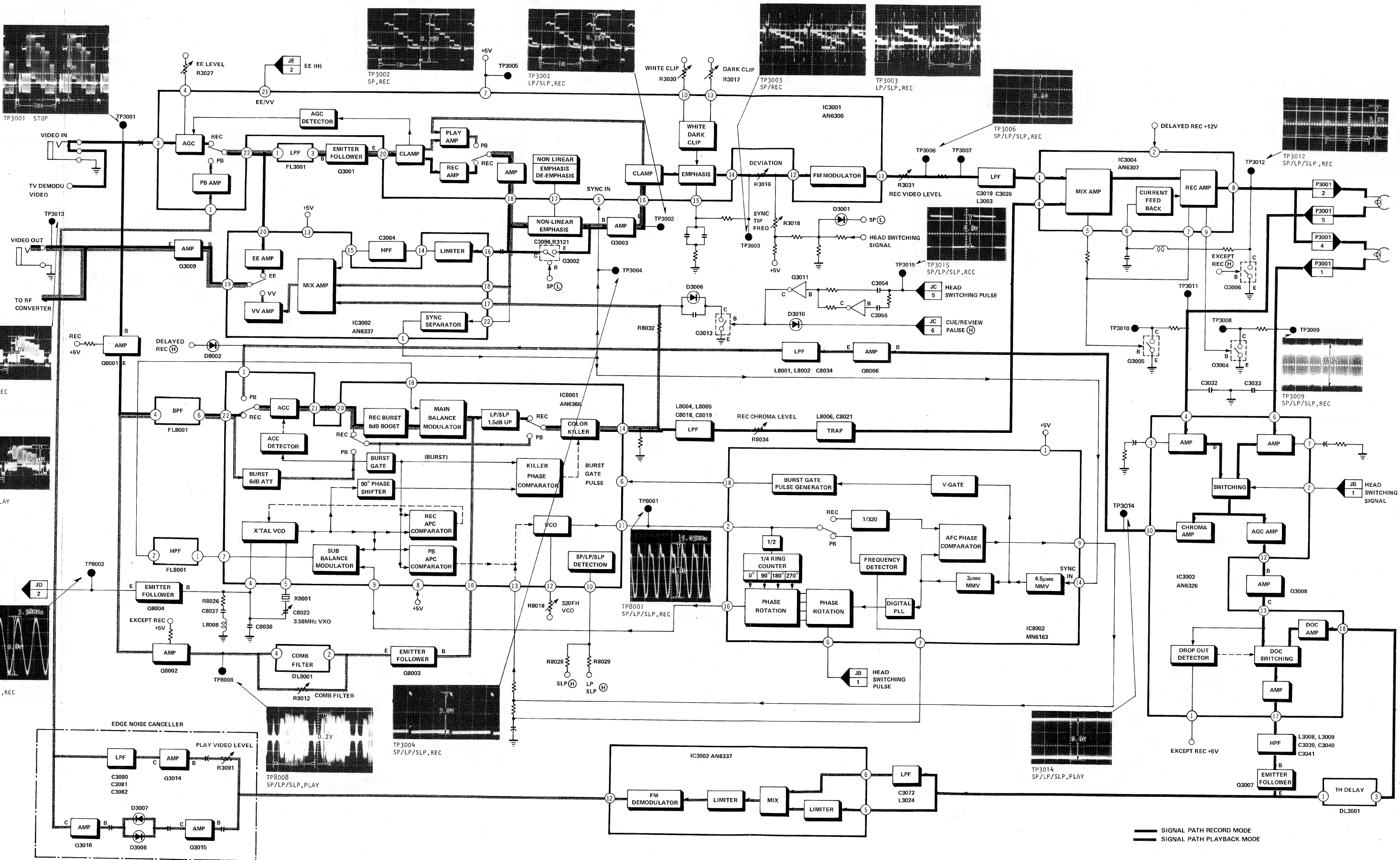
LOCATION OF ADJUSTMENT POINTS



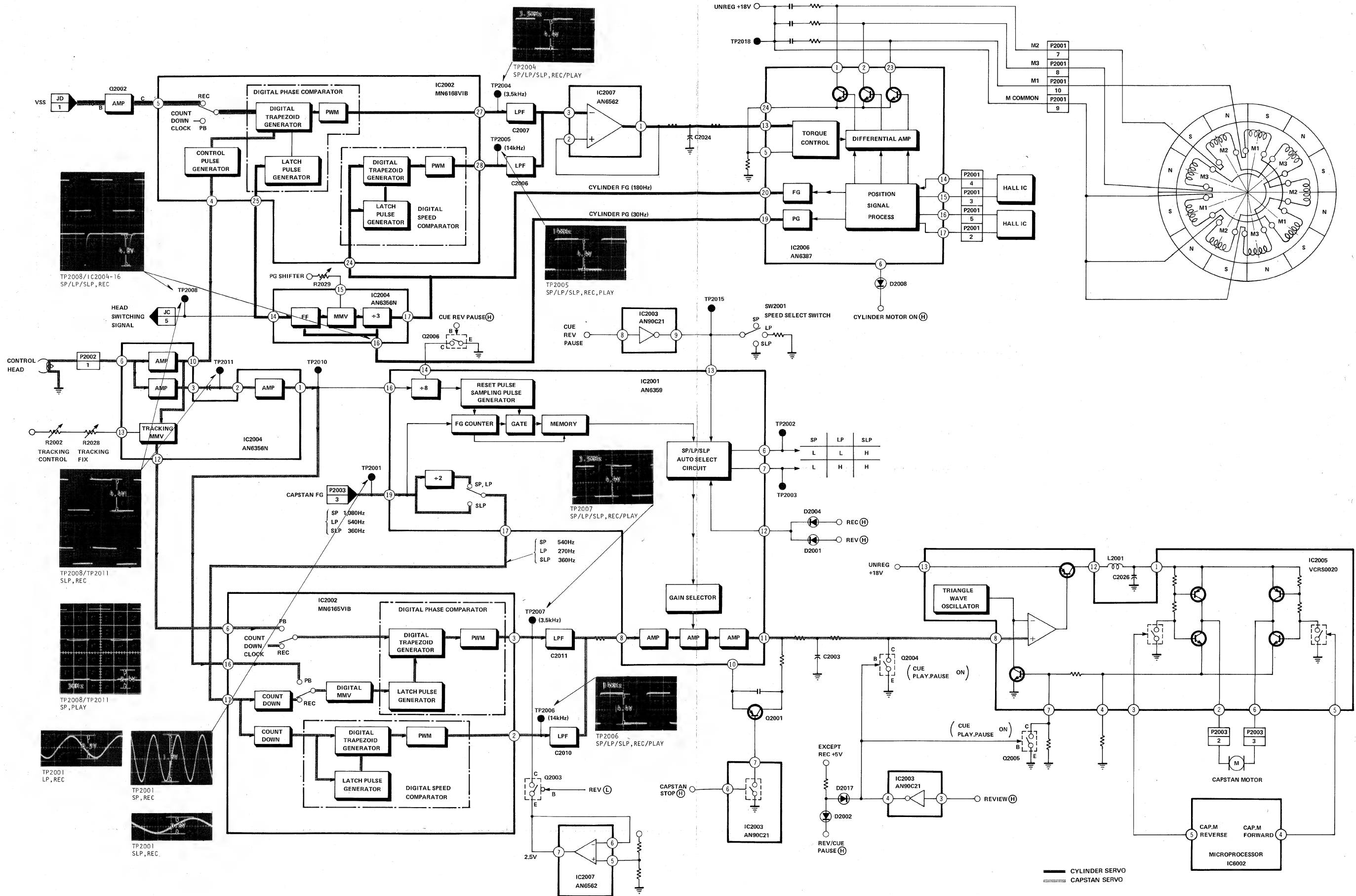
# LUMINANCE & CHROMINANCE BLOCK DIAGRAM



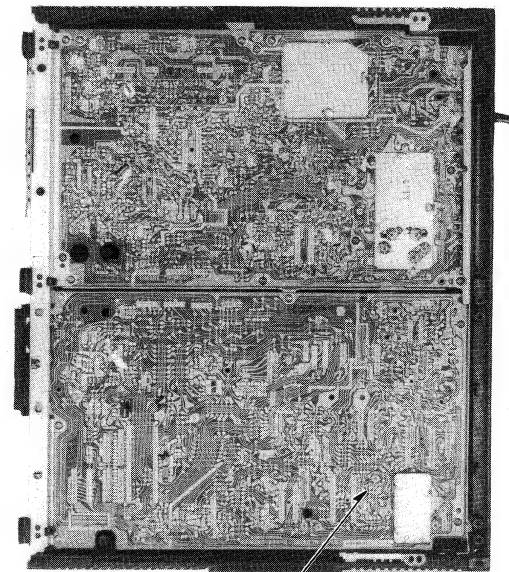
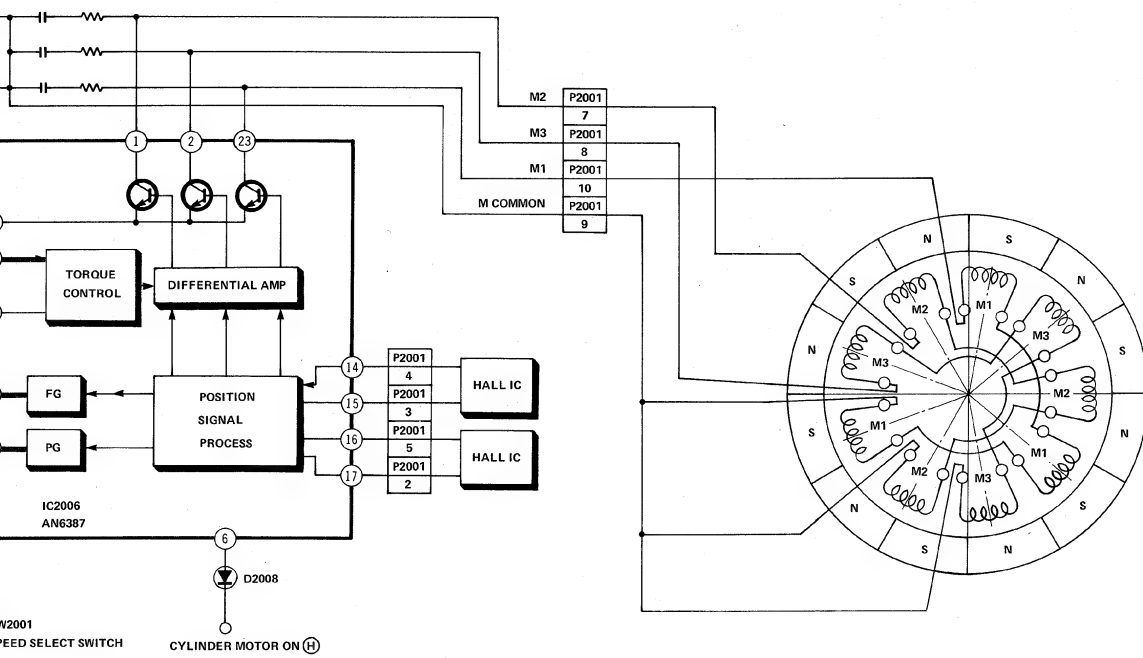
# MINANCE & CHROMINANCE BLOCK DIAGRAM



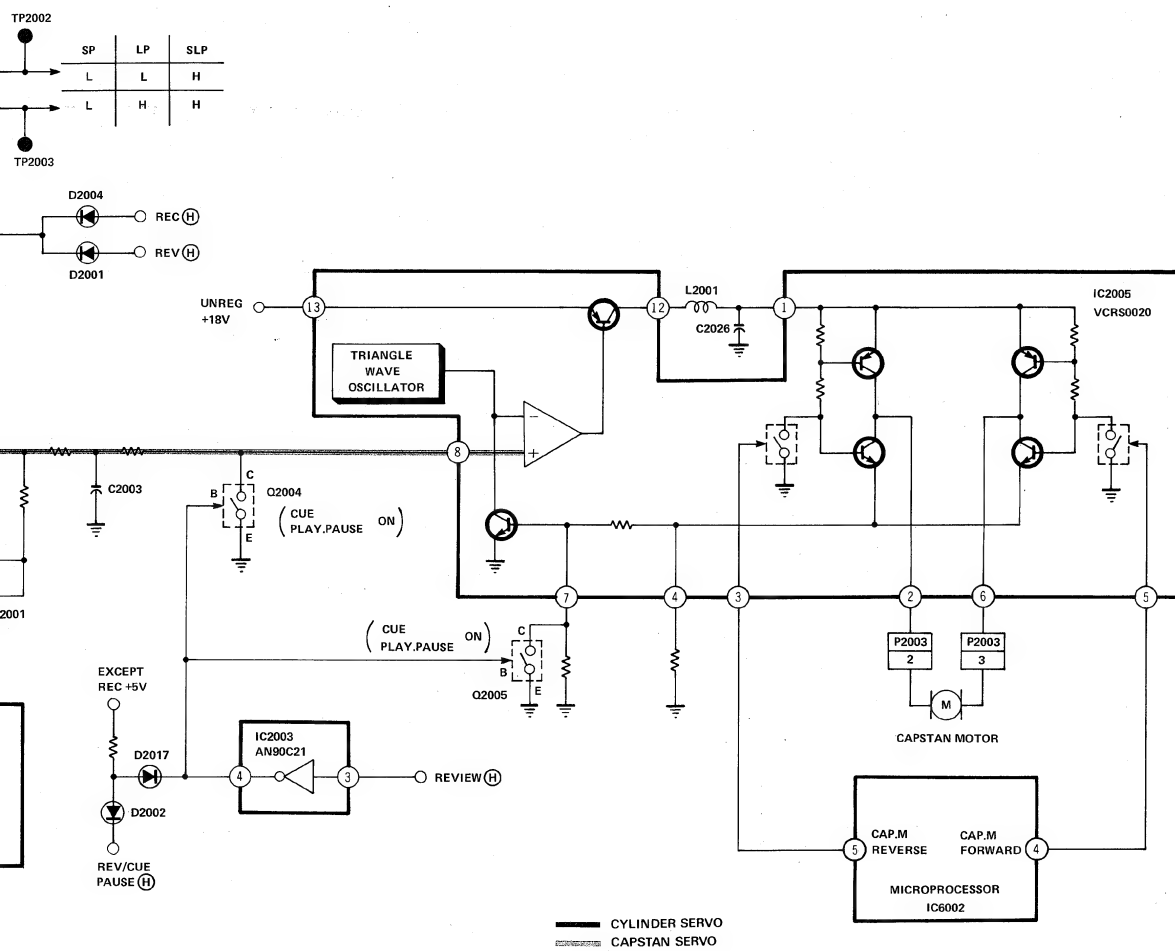
# SERVO BLOCK DIAGRAM



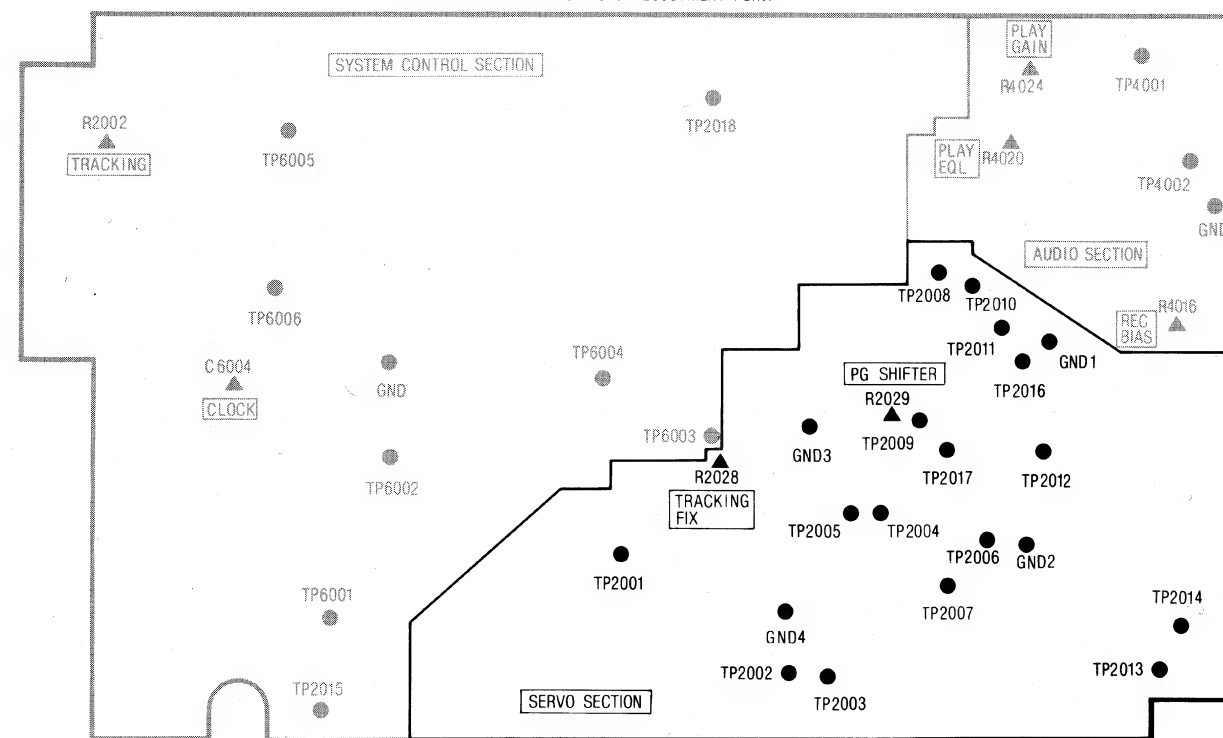




Servo Section  
(Servo/Audio/System  
Control C.B.A.)

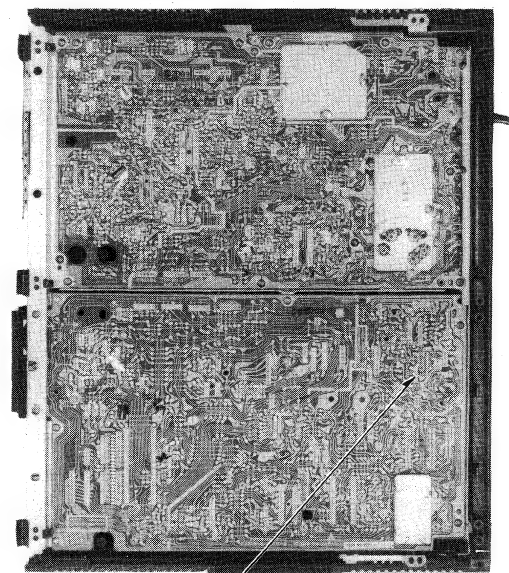


LOCATION OF TEST POINTS & ADJUSTMENT POINT

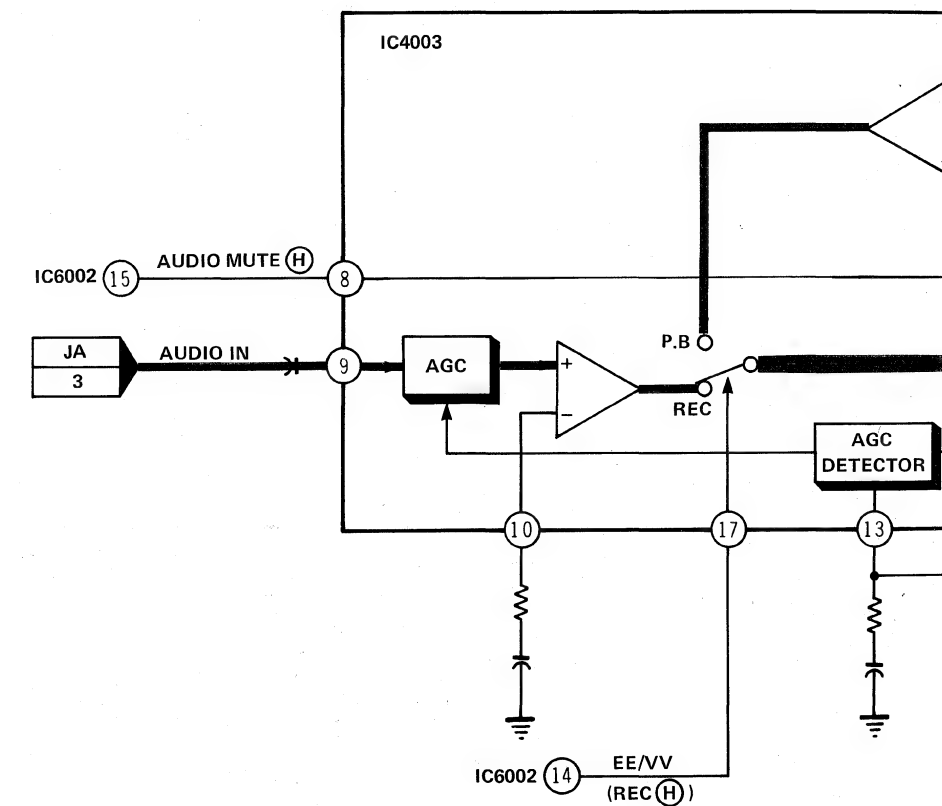
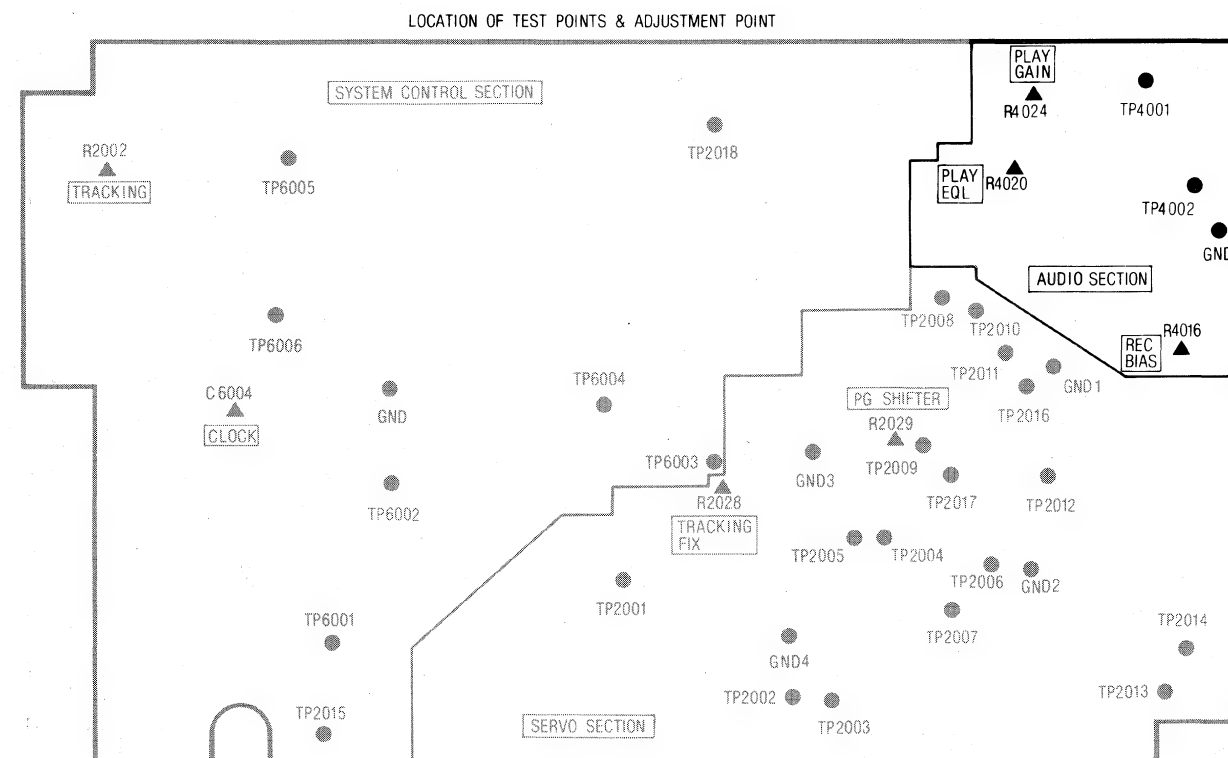




## AUDIO BLOCK DIAGRAM

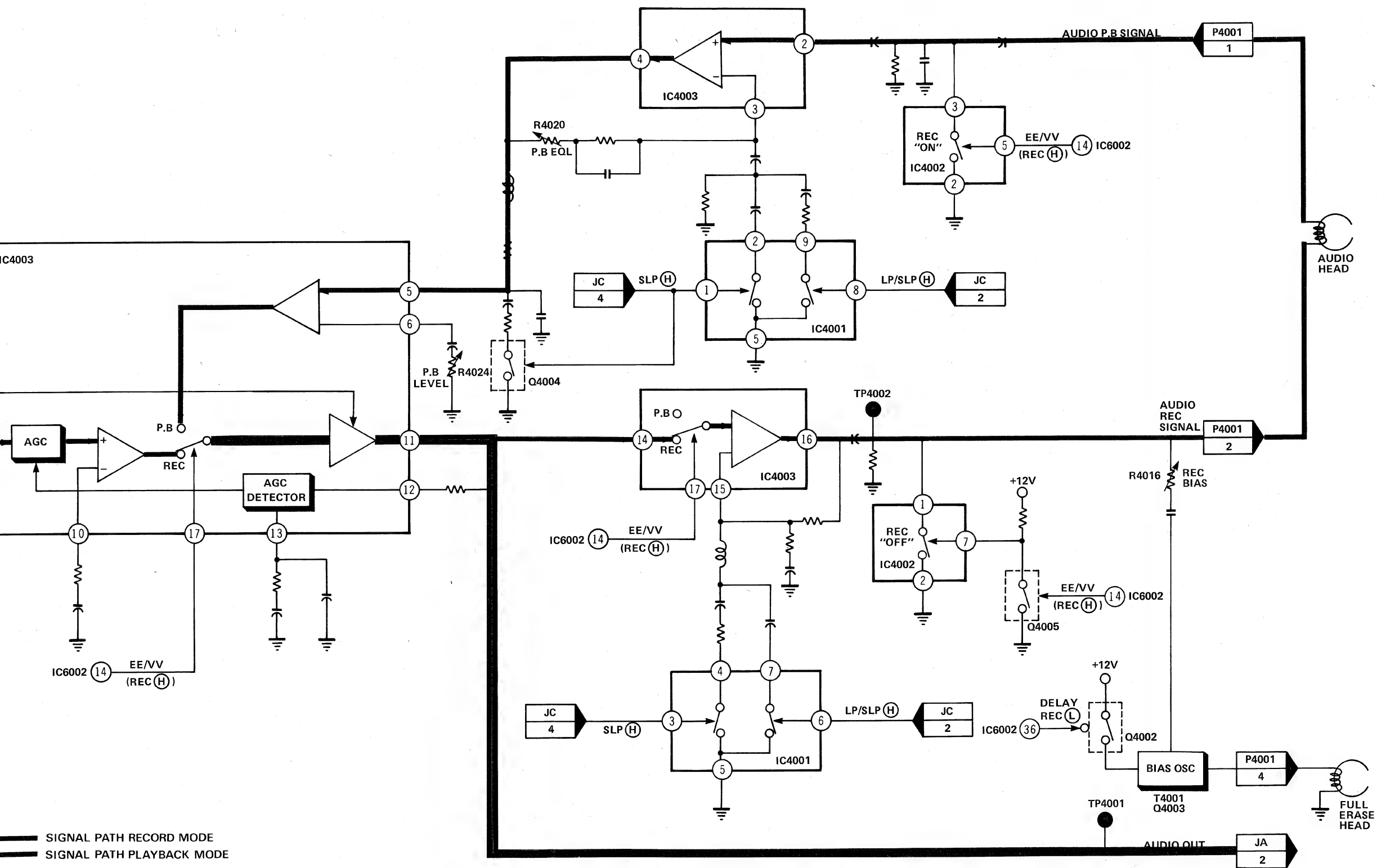


Audio Section  
(Servo/Audio/System  
Control C.B.A.)

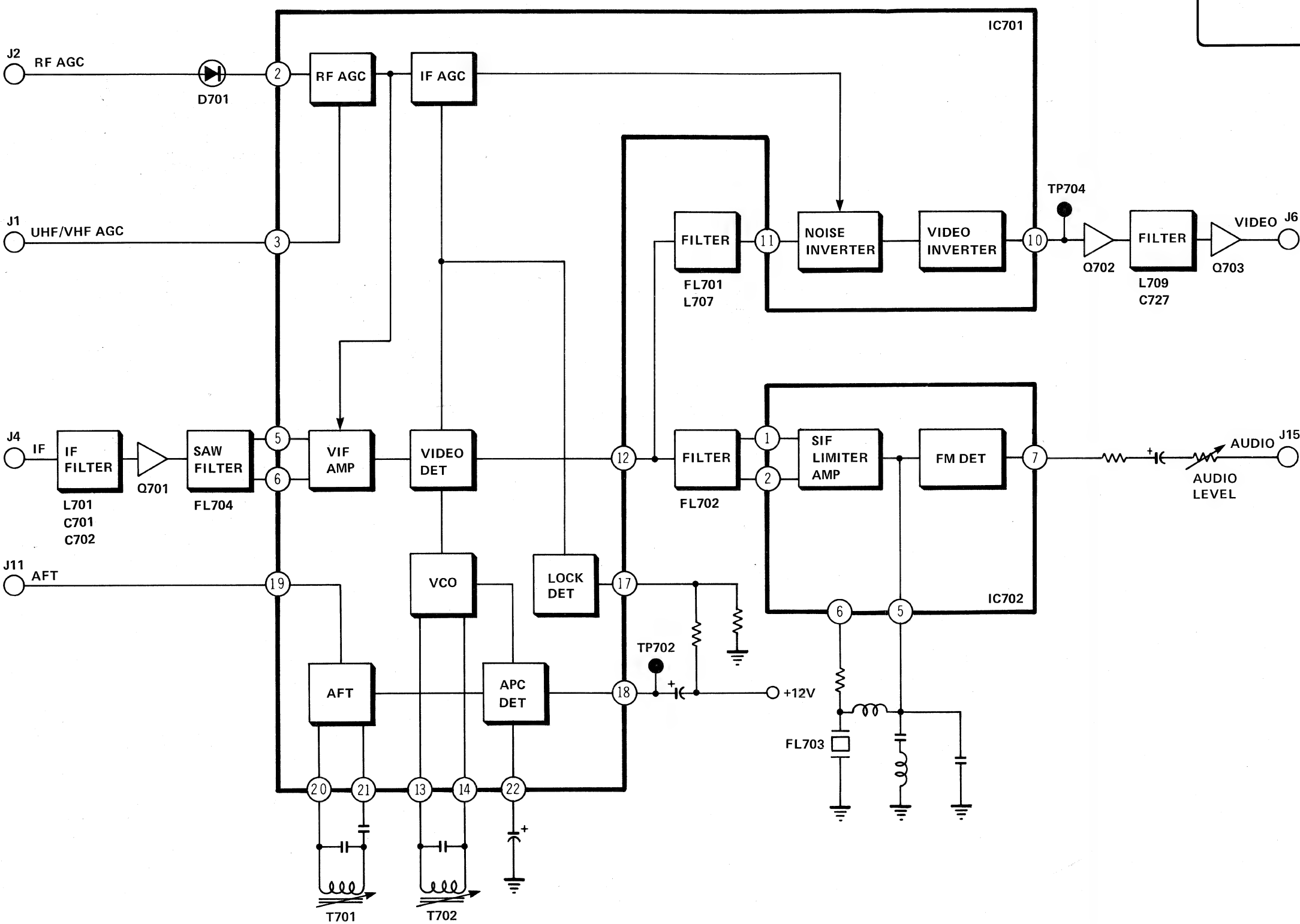


 SIGNAL PATH RECORD MODE  
 SIGNAL PATH PLAYBACK MODE

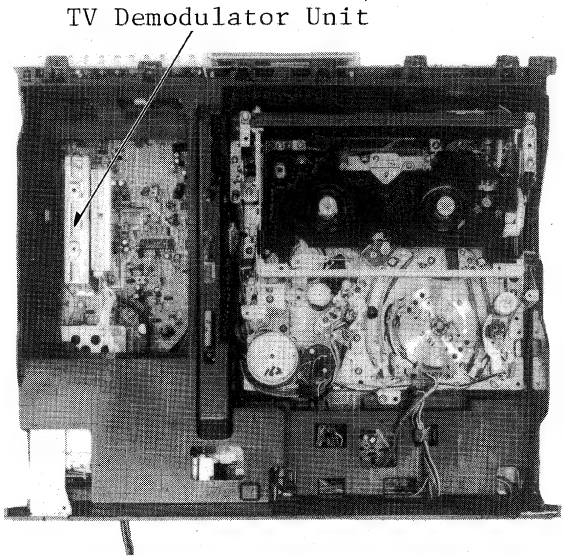
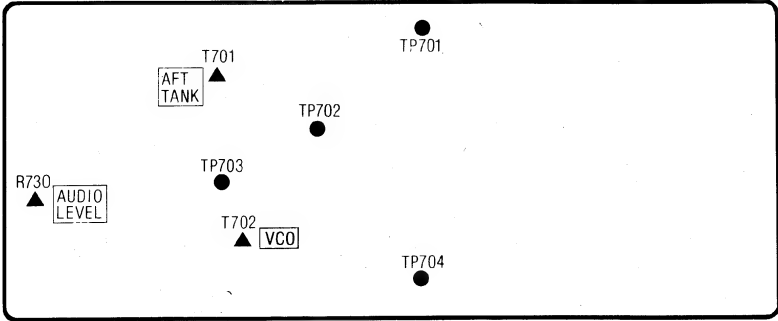
# DIAGRAM



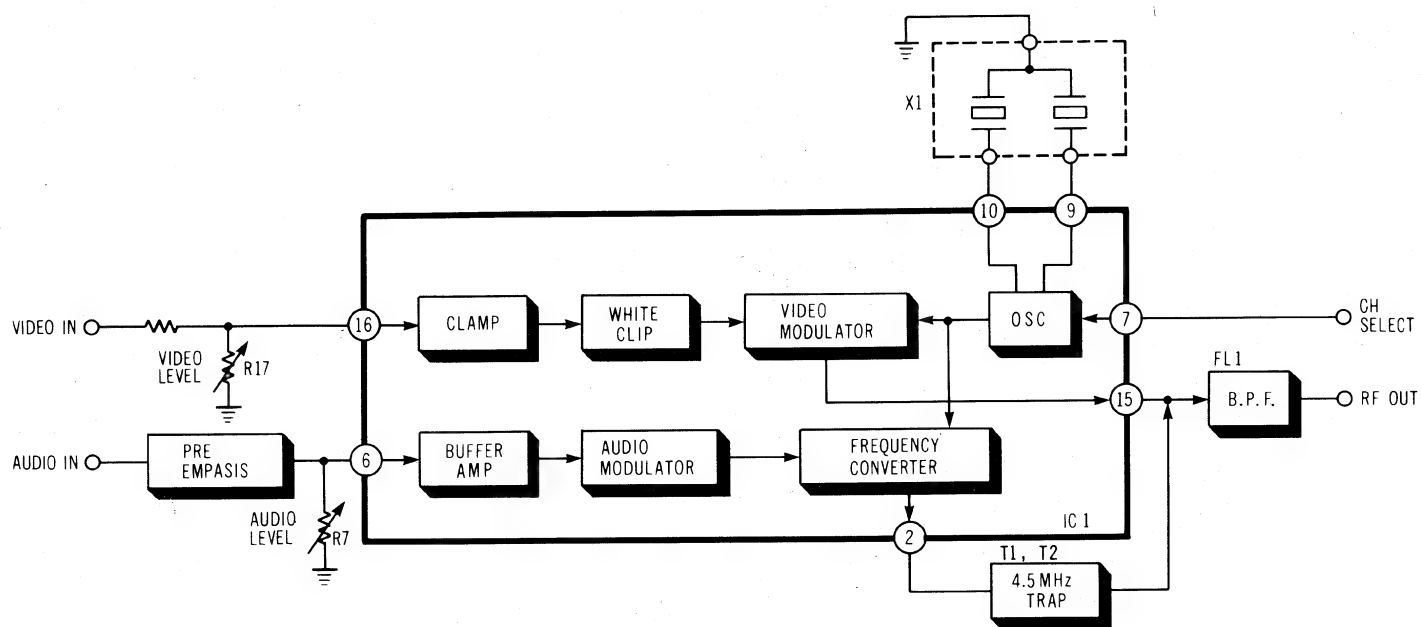
TV DEMODULATOR BLOCK DIAGRAM



LOCATION OF TEST POINTS & ADJUSTMENT POINTS



# RF CONVERTER BLOCK DIAGRAM

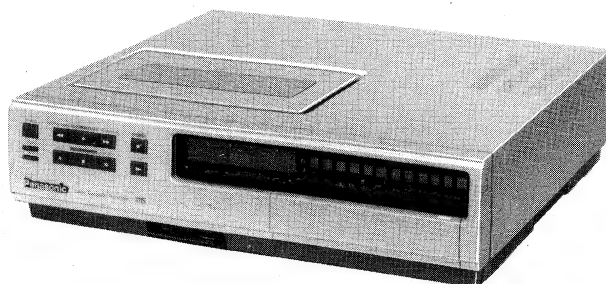


# Service Manual

Video Cassette Recorder

**Vol. 4**
**Panasonic**  
**Omnivision** **VHS**
**PV-1220**

**Schematic Diagrams**  
**Printed Circuit**  
**Board Diagrams**



## SPECIFICATIONS

Power Source: 120V AC  $\pm 10\%$ , 60 Hz  $\pm 0.5\%$   
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Audio Track: 1 track  
 Tape Format: Tape width 1/2" (12.7 mm), high density tape

Tape Speed: SP mode: 1-5/16 i.p.s. (33.35 mm/s)  
 LP mode: 21/32 i.p.s. (16.67 mm/s)  
 SLP mode: 7/16 i.p.s. (11.12 mm/s)

Record/Playback Time: 8 HRS. with 160 min. type tape used in SLP mode

FF/REW Time: Less than 6 min. with 120 min. type tape

Heads: Video: 2 rotary heads  
 Audio/Control: 1 stationary head  
 Erase: 1 full track erase  
 1 audio track erase

Input Level: Video: VIDEO IN Jack (RCA type)  
 1.0Vp-p, 75 $\Omega$  unbalanced

Audio: AUDIO IN Jack (RCA type)  
 -20dB, 100k $\Omega$  unbalanced  
 TV Tuners: VHF Input: VHF Ch2-Ch13,  
 75 $\Omega$  unbalanced  
 UHF Input: Ch14-Ch83,  
 300 $\Omega$  balanced

Output Level: Video: VIDEO OUT Jack (RCA type)  
 1.0Vp-p, 75 $\Omega$  unbalanced  
 Audio: AUDIO OUT Jack (RCA type)  
 -6dB, 600 $\Omega$  unbalanced

RF Modulated: Ch3/Ch4 switchable,  
 72dB $\mu$ , (Open Voltage)  
 75 $\Omega$  unbalanced

### Video Horizontal

Resolution: Color: more than 230 lines  
 B/W: more than 230 lines

### Audio Frequency

Response: SP mode: 100 Hz ~ 8 kHz  
 (10dB down) LP mode: 100 Hz ~ 6 kHz  
 SLP mode: 150 Hz ~ 5 kHz

Signal-to-Noise Ratio: Video: SP mode: better than 40dB  
 LP mode: better than 40dB  
 SLP mode: better than 40dB  
 (Rohde & Schwarz noise meter)  
 Audio: SP mode: better than 42dB  
 LP mode: better than 40dB  
 SLP mode: better than 40dB

### Operation

Temperature: 41°F - 104°F (5°C - 40°C)

Operating Humidity: 10% - 75%

Weight: 17.6 lbs. (8.0 kg)

Dimensions: 16-15/16" (W)  $\times$  14-3/8" (D)  $\times$  4-1/2" (H)  
 (430 mm  $\times$  365 mm  $\times$  115 mm)

### Accessories Supplied:

- Remote control unit
- VHF matching box 75 $\Omega$  - 300 $\Omega$  transformer
- 300 $\Omega$  - 75 $\Omega$  transformer
- Coaxial cable with one-touch type F Connector
- Twin-lead cable

### Available Tapes:

1/2" VHS video cassette tapes  
 NV-T160 Approx. 1073 ft. (327 m), 160,  
 320, or 480 min  
 NV-T120 Approx. 810 ft. (247 m), 120, 240,  
 or 360 min  
 NV-T60 Approx. 417 ft. (127 m), 60, 120,  
 or 180 min.

Weight and dimensions shown are approximate. Specifications are subject to change without notice.

**Panasonic**®

Matsushita Engineering & Service Company  
 Division of Matsushita Electric  
 Corporation of America  
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Panasonic Hawaii Inc.  
 91-238 Kauhii St. Ewa Beach  
 P.O. Box 774  
 Honolulu, Hawaii 96808-0774

Matsushita Electric  
 of Canada Limited  
 5770 Ambler Drive, Mississauga,  
 Ontario, L4W 2T3

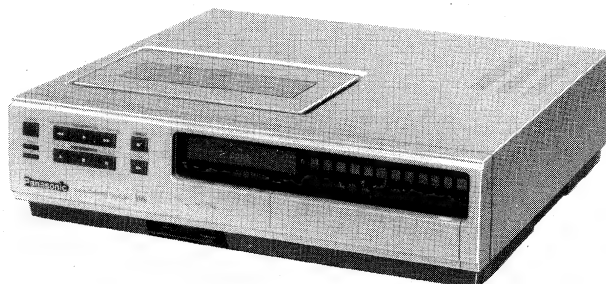
Panasonic Sales Company,  
 Division of Matsushita Electric  
 of Puerto Rico, Inc.  
 Ave. 65 De Infanteria, KM 9.7  
 Victoria Industrial Park  
 Carolina, Puerto Rico 00630

# Service Manual

**Vol. 4**

**Schematic Diagrams**  
**Printed Circuit**  
**Board Diagrams**

Video Cassette Recorder

**Panasonic** **VHS**  
**Omnivision**
**PV-1220**


## SPECIFICATIONS

Power Source: 120 V AC  $\pm 10\%$ , 60 Hz  $\pm 0.5\%$   
 Power Consumption: Approx. 21 watts  
 Television System: EIA Standard (525 lines, 60 fields)  
 NTSC color signal

### Video Recording

System: 2 rotary heads, helical scanning system  
 Luminance: FM azimuth recording  
 Color signal: Converted subcarrier phase shift recording

Audio Track: 1 track  
 Tape Format: Tape width 1/2" (12.7 mm), high density tape

Tape Speed: SP mode: 1-5/16 i.p.s. (33.35 mm/s)  
 LP mode: 21/32 i.p.s. (16.67 mm/s)  
 SLP mode: 7/16 i.p.s. (11.12 mm/s)

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 -20 dB, 100 k $\Omega$  unbalanced

TV Tuners: VHF Input: VHF Ch2-Ch13,  
 75  $\Omega$  unbalanced  
 UHF Input: Ch14-Ch83,  
 300  $\Omega$  balanced

Output Level: Video: VIDEO OUT Jack (RCA type)  
 1.0 Vp-p, 75  $\Omega$  unbalanced  
 Audio: AUDIO OUT Jack (RCA type)  
 -6 dB, 600  $\Omega$  unbalanced

RF Modulated: Ch3/Ch4 switchable,  
 72 dB $\mu$ , (Open Voltage)  
 75  $\Omega$  unbalanced

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Resolution: Color: more than 230 lines  
 B/W: more than 230 lines

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 SLP mode: 150 Hz ~ 5 kHz

Signal-to-Noise Ratio: Video: SP mode: better than 40 dB  
 LP mode: better than 40 dB  
 SLP mode: better than 40 dB  
 (Rohde & Schwarz noise meter)  
 Audio: SP mode: better than 42 dB  
 LP mode: better than 40 dB  
 SLP mode: better than 40 dB

### Operation

Temperature: 41°F—104°F (5°C—40°C)

Operating Humidity: 10%—75%

Weight: 17.6 lbs. (8.0 kg)

Dimensions: 16-15/16" (W)  $\times$  14-3/8" (D)  $\times$  4-1/2" (H)  
 (430 mm  $\times$  365 mm  $\times$  115 mm)

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 • VHF matching box 75  $\Omega$ —300  $\Omega$  transformer  
 • 300  $\Omega$ —75  $\Omega$  transformer  
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Available Tapes: 1/2" VHS video cassette tapes  
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## IMPORTANT SAFETY NOTICE

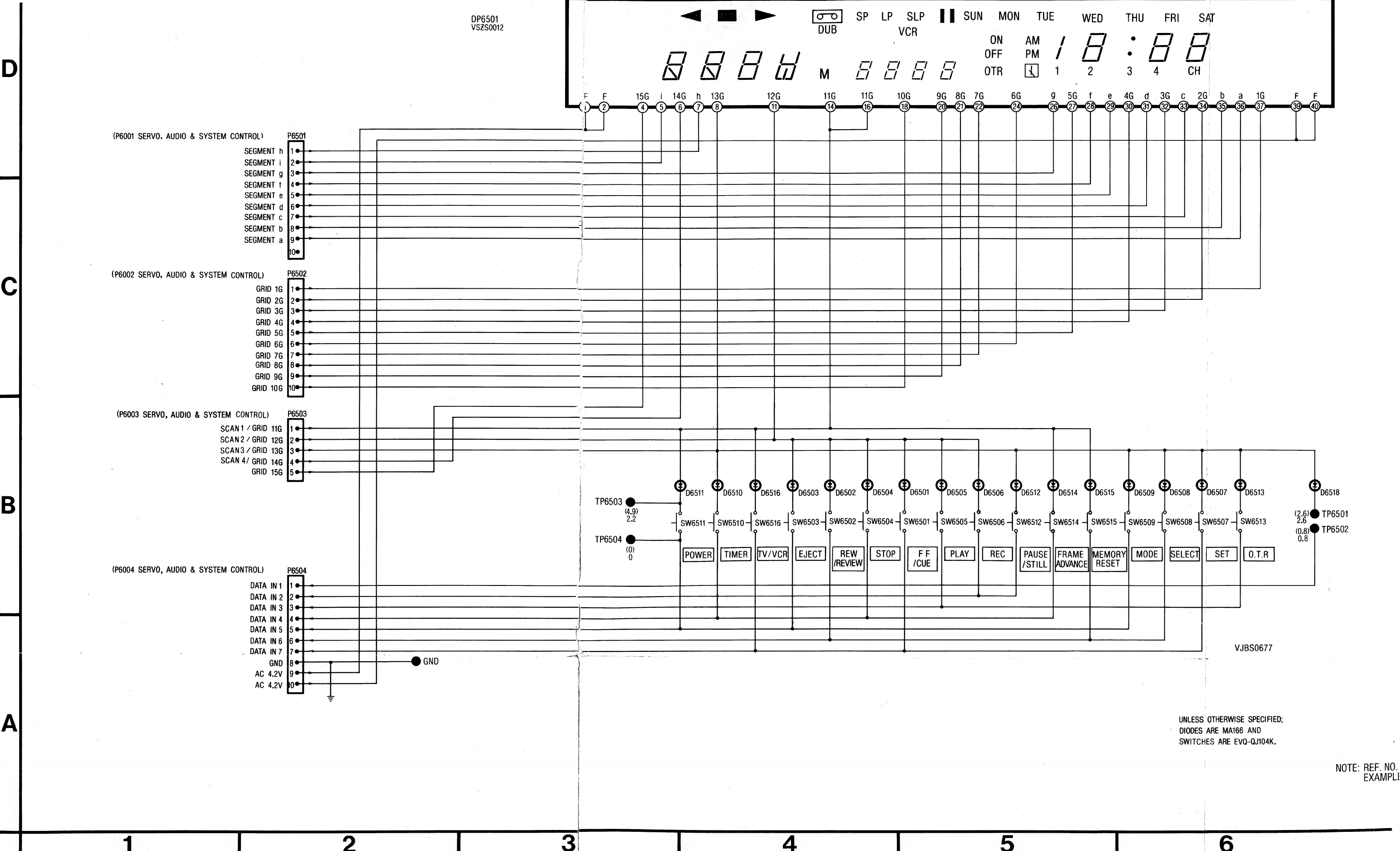
There are special components used in this equipment which are important for safety. These parts are shaded on the schematic diagram and on the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire, or other hazards. Do not modify the original design without permission of manufacturer.



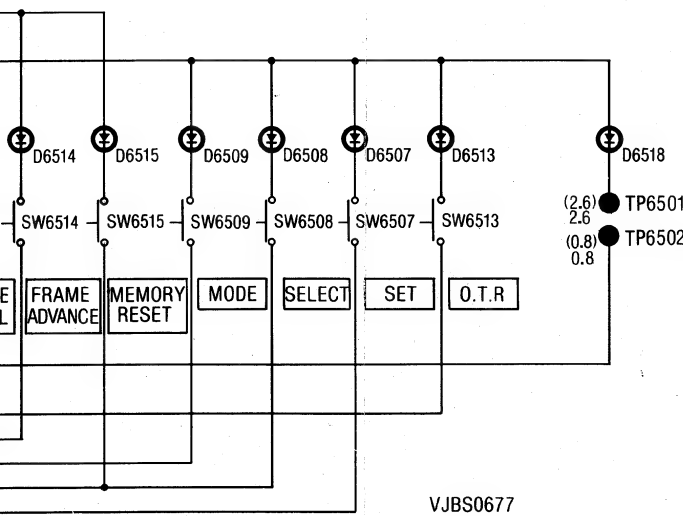
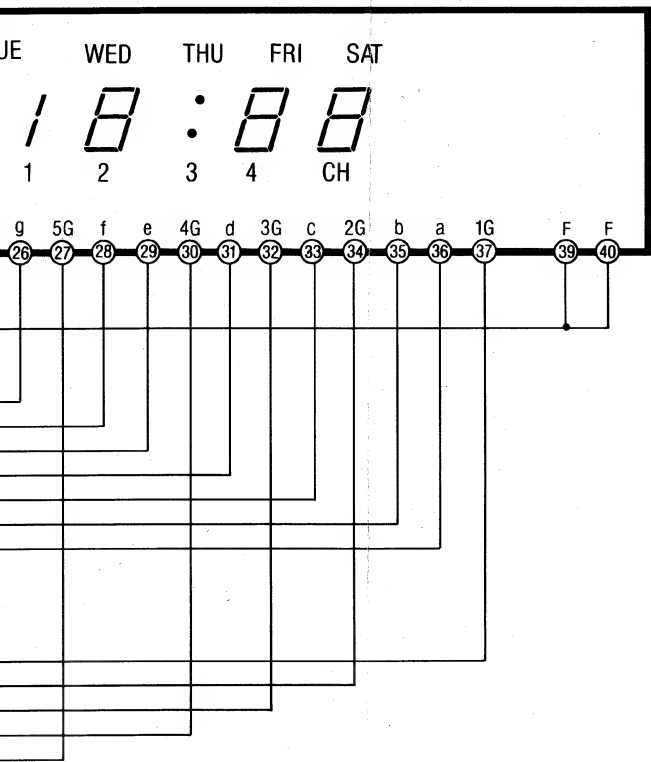
OPERATION SCHEMATIC DIAGRAM

VOLTAGE MEASUREMENT:  
COLOR BAR SIGNAL IN SP REC MODE WITH BRACKET.  
COLOR BAR SIGNAL IN SP PLAY MODE WITHOUT BRACKET.

CALLOUTS NEXT TO WIRING PLUGS INDICATE  
CONNECTIONS TO OTHER SCHEMATIC DIAGRAM



CALLOUTS NEXT TO WIRING PLUGS INDICATE  
CONNECTIONS TO OTHER SCHEMATIC DIAGRAM.

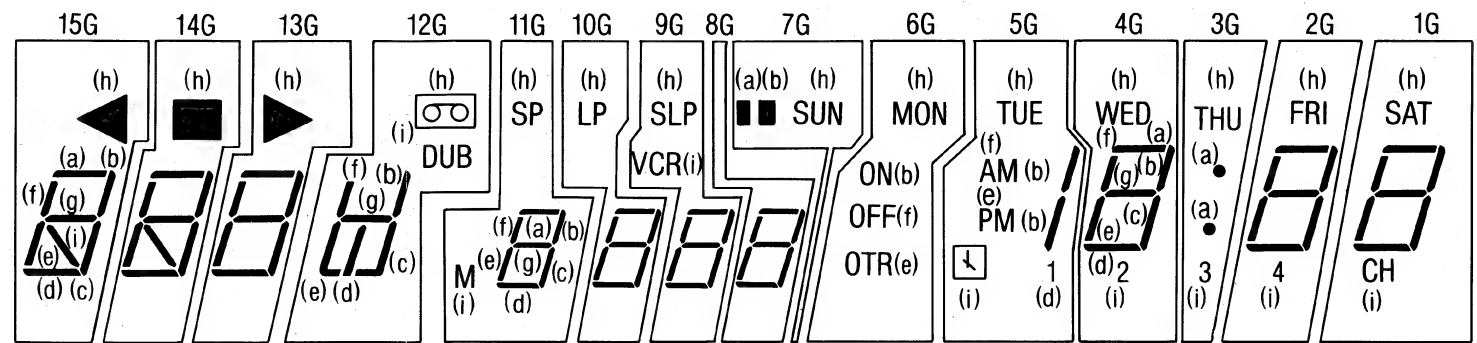


VJBS0677

UNLESS OTHERWISE SPECIFIED;  
DIODES ARE MA166 AND  
SWITCHES ARE EVQ-QJ104K.

NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.  
EXAMPLE: C.B.A.---R2, REF. NO. 6500 SERIES  
SCHEMATIC DIAGRAM---R6502  
(R6502 IS ABBREVIATED TO R2)

TIMER DISPLAY (DP6501) CONNECTION CHART



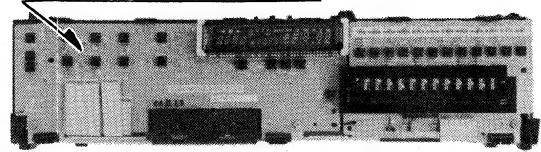
PIN NO.	SIGNAL NAME
1	F
2	F
3	—
4	GRID 15G
5	SEGMENT i
6	GRID 14G
7	SEGMENT h
8	GRID 13G
9	—
10	—

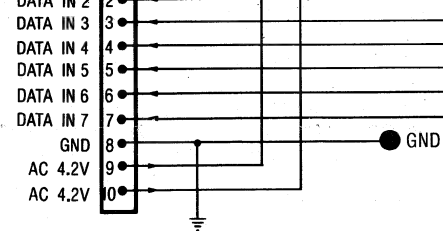
PIN NO.	SIGNAL NAME
11	GRID 12G
12	—
13	—
14	GRID 11G
15	—
16	GRID 11G
17	—
18	GRID 10G
19	—
20	GRID 9G

PIN NO.	SIGNAL NAME
21	GRID 8G
22	GRID 7G
23	—
24	GRID 6G
25	—
26	SEGMENT g
27	GRID 5G
28	SEGMENT f
29	SEGMENT e
30	GRID 4G

PIN NO.	SIGNAL NAME
31	SEGMENT d
32	GRID 3G
33	SEGMENT c
34	GRID 2G
35	SEGMENT b
36	SEGMENT a
37	GRID 1G
38	—
39	F
40	F

OPERATION C.B.A.





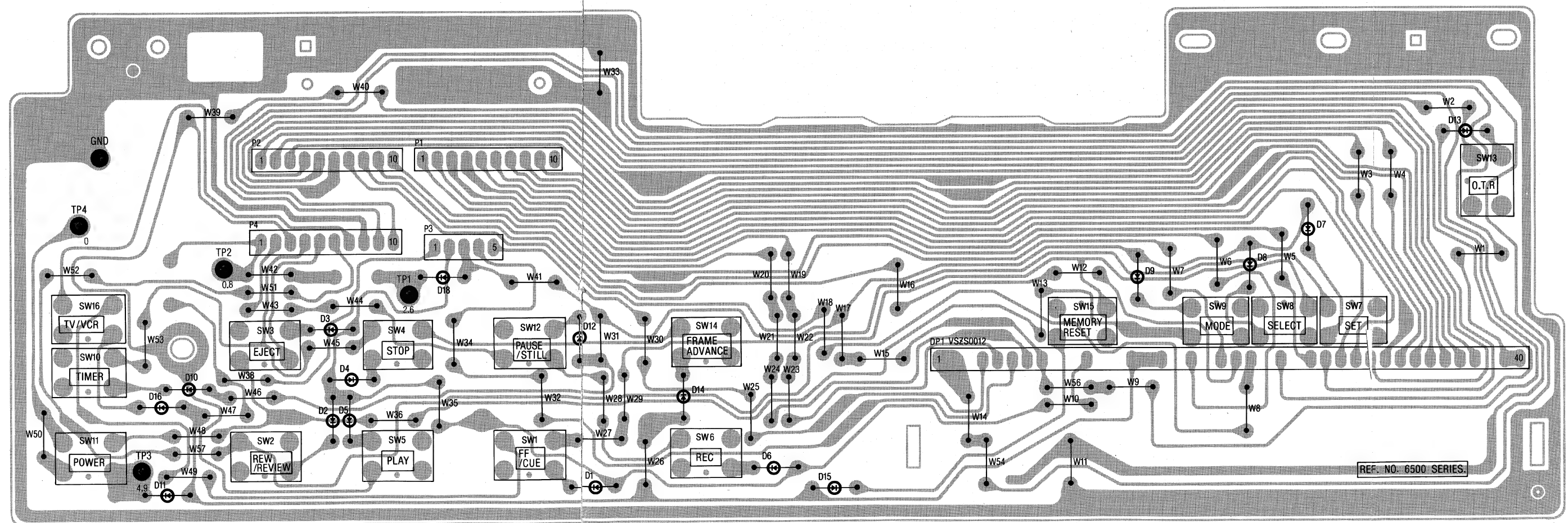
VJBS0677

UNLESS OTHERWISE SPECIFIED;  
DIODES ARE MA166 AND  
SWITCHES ARE EVQ-QJ104K.

NOTE: RE  
EX

# OPERATION C.B.A. VEPS0677A

VOLTAGE MEASUREMENT : COLOR BAR SIGNAL  
IN SP REC MODE.



P6501

1	SEGMENT h
2	SEGMENT i
3	SEGMENT g
4	SEGMENT f
5	SEGMENT e
6	SEGMENT d
7	SEGMENT c
8	SEGMENT b
9	SEGMENT a
10	

P6502

1	GRID 1G
2	GRID 2G
3	GRID 3G
4	GRID 4G
5	GRID 5G
6	GRID 6G
7	GRID 7G
8	GRID 8G
9	GRID 9G
10	GRID 10G

P6503

1	GRID 11G
2	GRID 12G
3	GRID 13G
4	GRID 14G
5	GRID 15G

P6504

1	DATA IN 1
2	DATA IN 2
3	DATA IN 3
4	DATA IN 4
5	DATA IN 5
6	DATA IN 6
7	DATA IN 7
8	GND
9	AC 4.2V
10	AC 4.2V

REF. NO. 6500 SERIES.

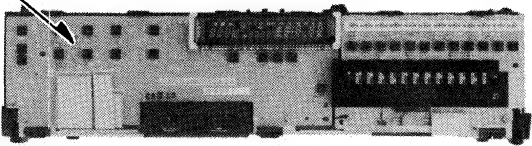
VJBS0677

UNLESS OTHERWISE SPECIFIED;  
DIODES ARE MA166 AND  
SWITCHES ARE EVQ-QJ104K.

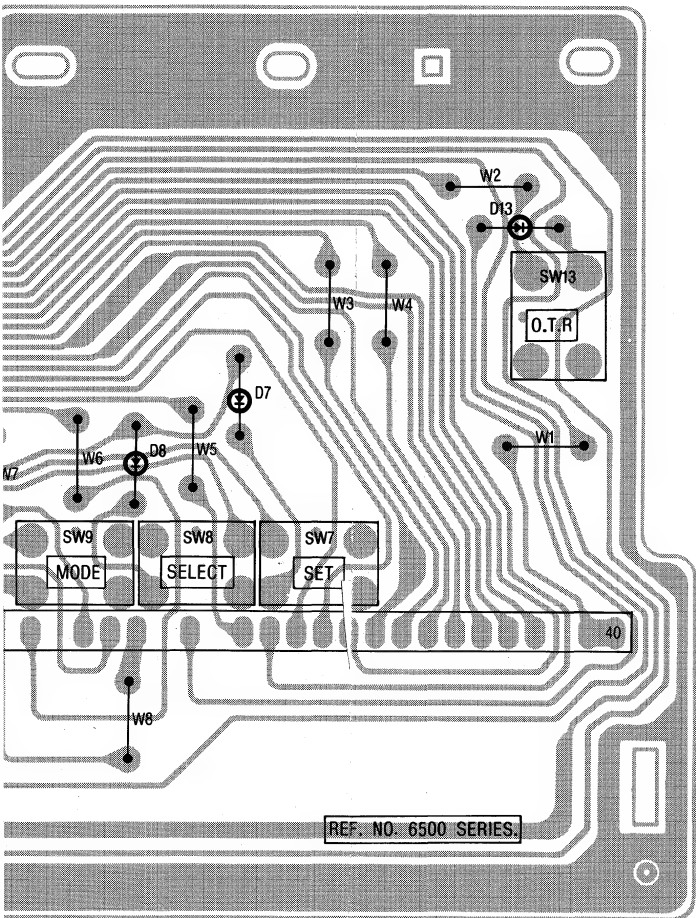
UNLESS OTHERWISE SPECIFIED;  
DIODES ARE MA166 AND  
SWITCHES ARE EVQ-QJ104K.

NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.  
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SCHEMATIC DIAGRAM---R6502  
(R6502 IS ABBREVIATED TO R2)

OPERATION C.B.A.



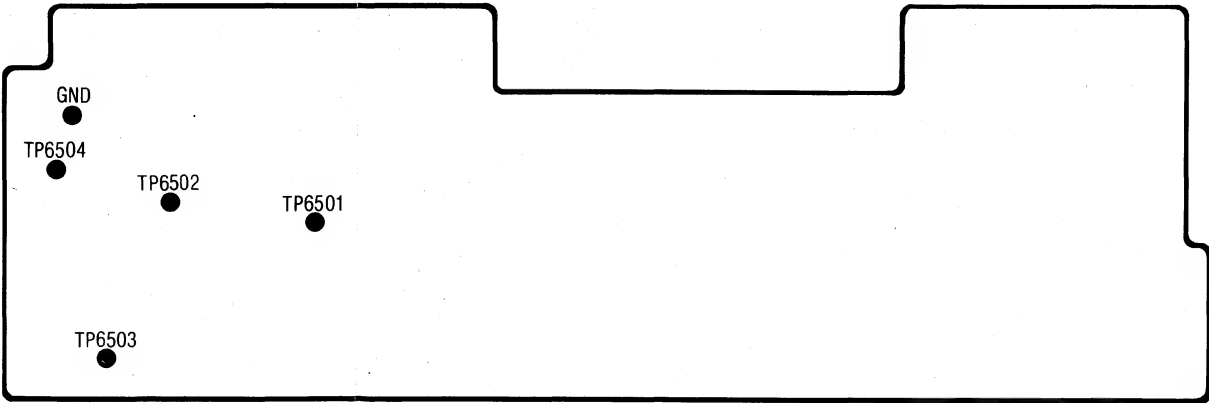
AR SIGNAL  
MODE.



UNLESS OTHERWISE SPECIFIED;  
DIODES ARE MA166 AND  
SWITCHES ARE EVQ-QJ104K.


TP NO.	STOP	REC	PLAY	CUE	REV
TP6501	2.7	2.6	2.6	2.6	2.6
TP6502	3.2	0.8	0.8	0.8	0.8
TP6503	2.3	4.9	2.2	2.3	2.3
TP6504	0	0	0	0	0

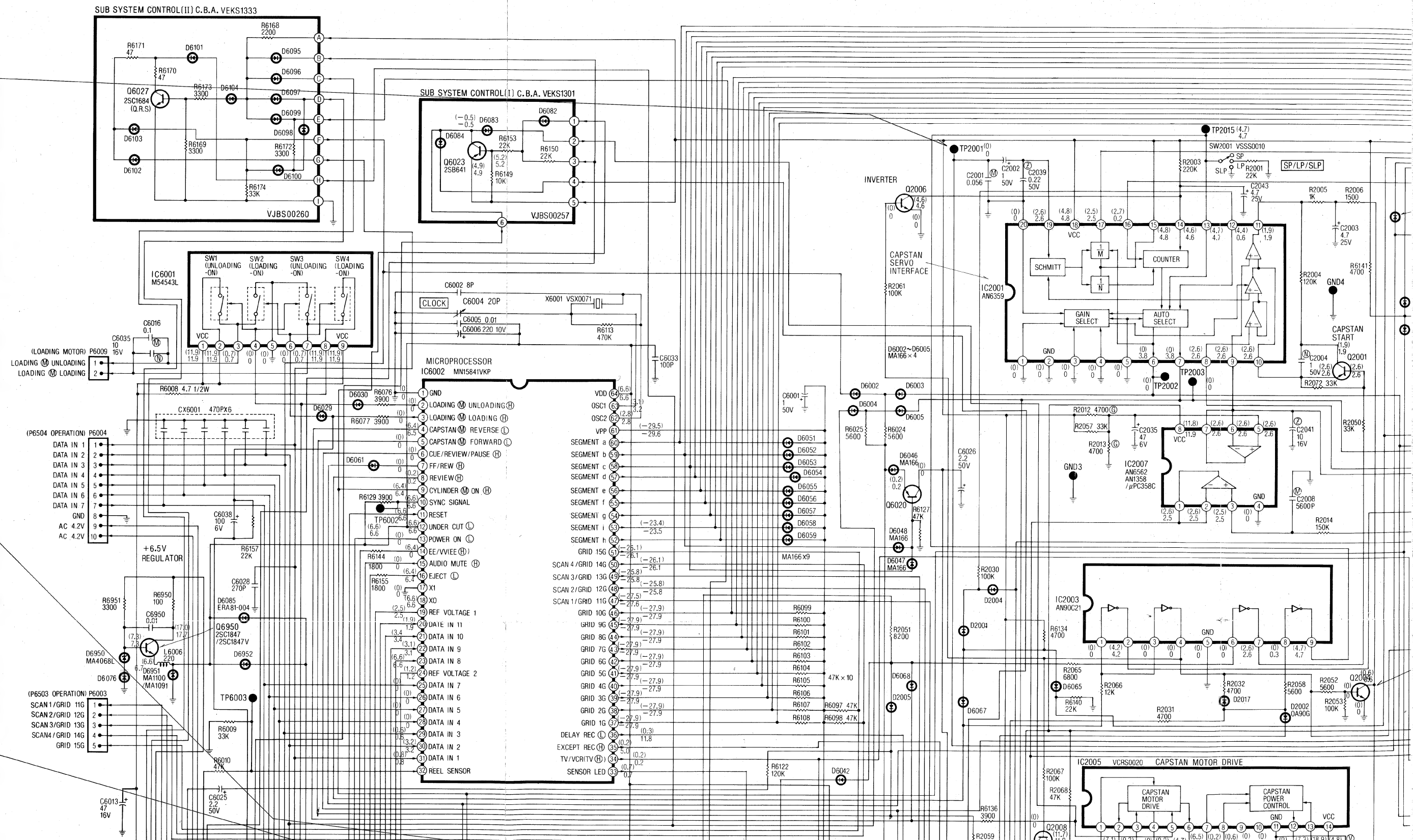
LOCATION OF TEST POINTS





# SERVO, AUDIO & SYSTEM CONTROL SCHEMATIC DIAGRAM

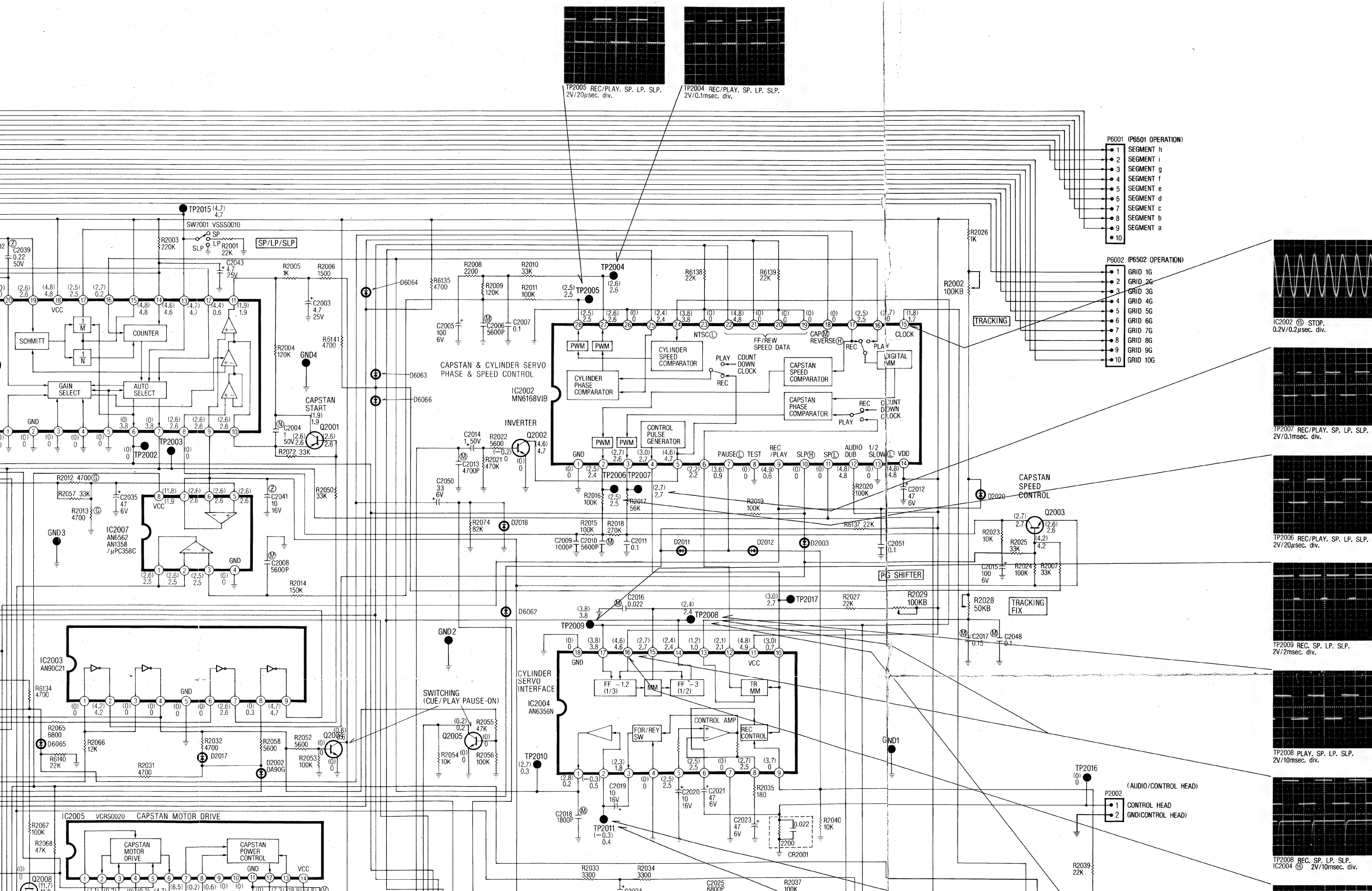
**IMPORTANT SAFETY NOTICE:**  
COMPONENTS IDENTIFIED BY THE SIGN  HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE ORIGINALLY SPECIFIED PARTS.



**NOTICE:**  
BY THE SIGN  HAVE SPECIAL  
IMPORTANT FOR SAFETY.  
IF THESE COMPONENTS,USE ONLY THE  
PARTS.

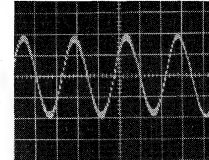
VOLTAGE MEASUREMENT:  
 COLOR BAR SIGNAL IN SP REC MODE WITH BRACKET.  
 COLOR BAR SIGNAL IN SP PLAY MODE WITHOUT BRACKET.

CALLOUTS NEXT TO WIRING PLUGS INDICATE CONNECTIONS TO OTHER SCHEMATIC DIAGRAM.

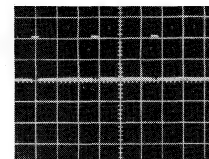


E

TP4001 REC. SP. LP. SLP.  
0.2V/1msec. div.



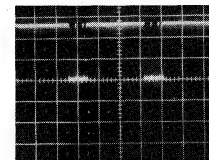
TP4001 PLAY. SP. LP. SLP.  
0.2V/1msec. div.



TP6001 STOP.  
2V/5msec. div.

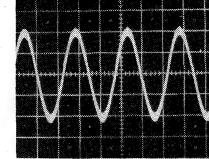
D

C



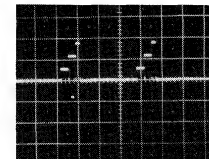
TP6004 STOP.  
2V/0.5msec. div.

B

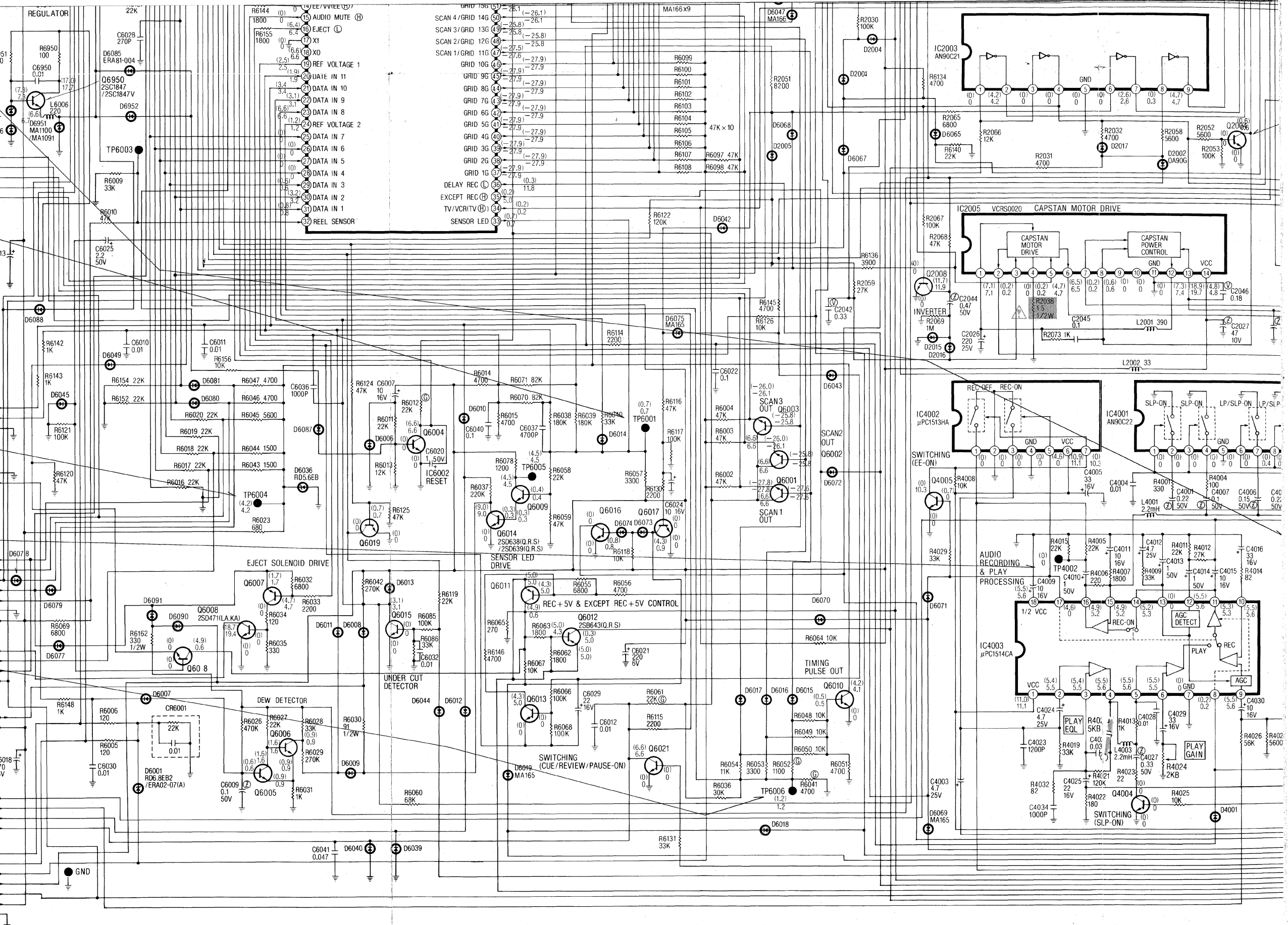
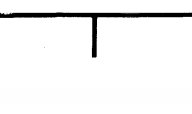
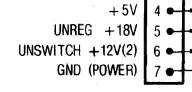
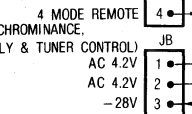
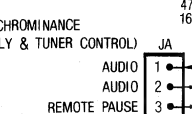
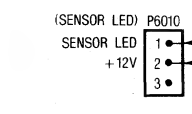
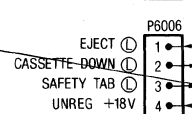
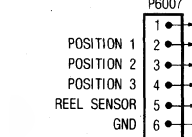
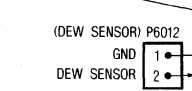
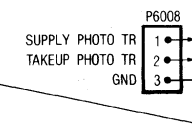
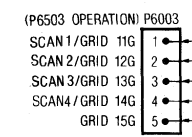
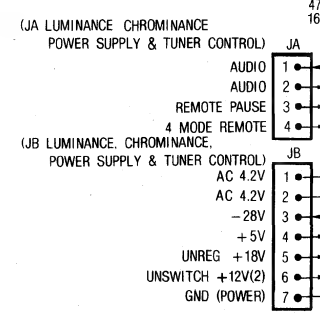


TP4002 REC. SP. LP. SLP.  
0.2V/1msec. div.

A



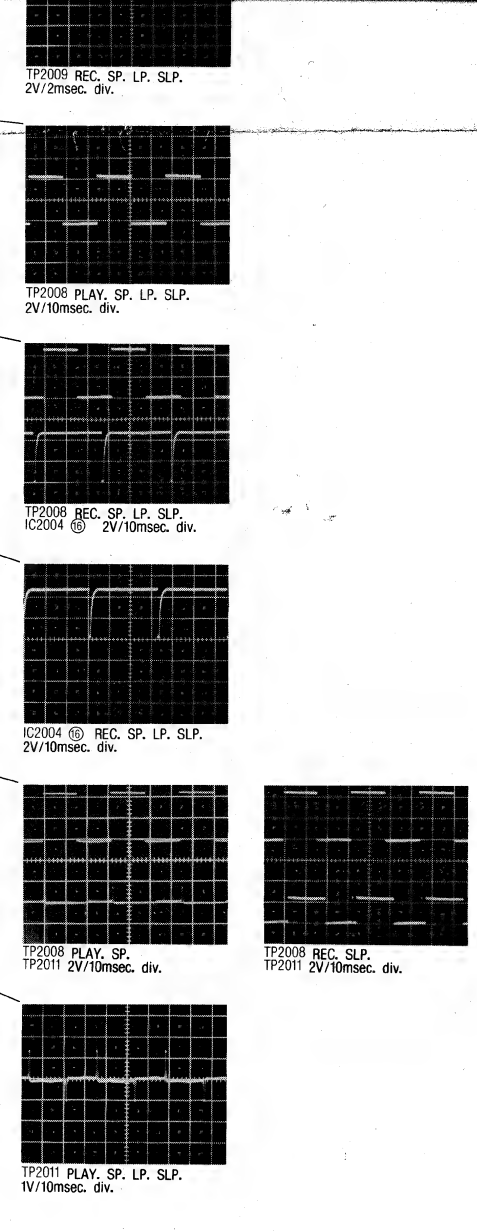
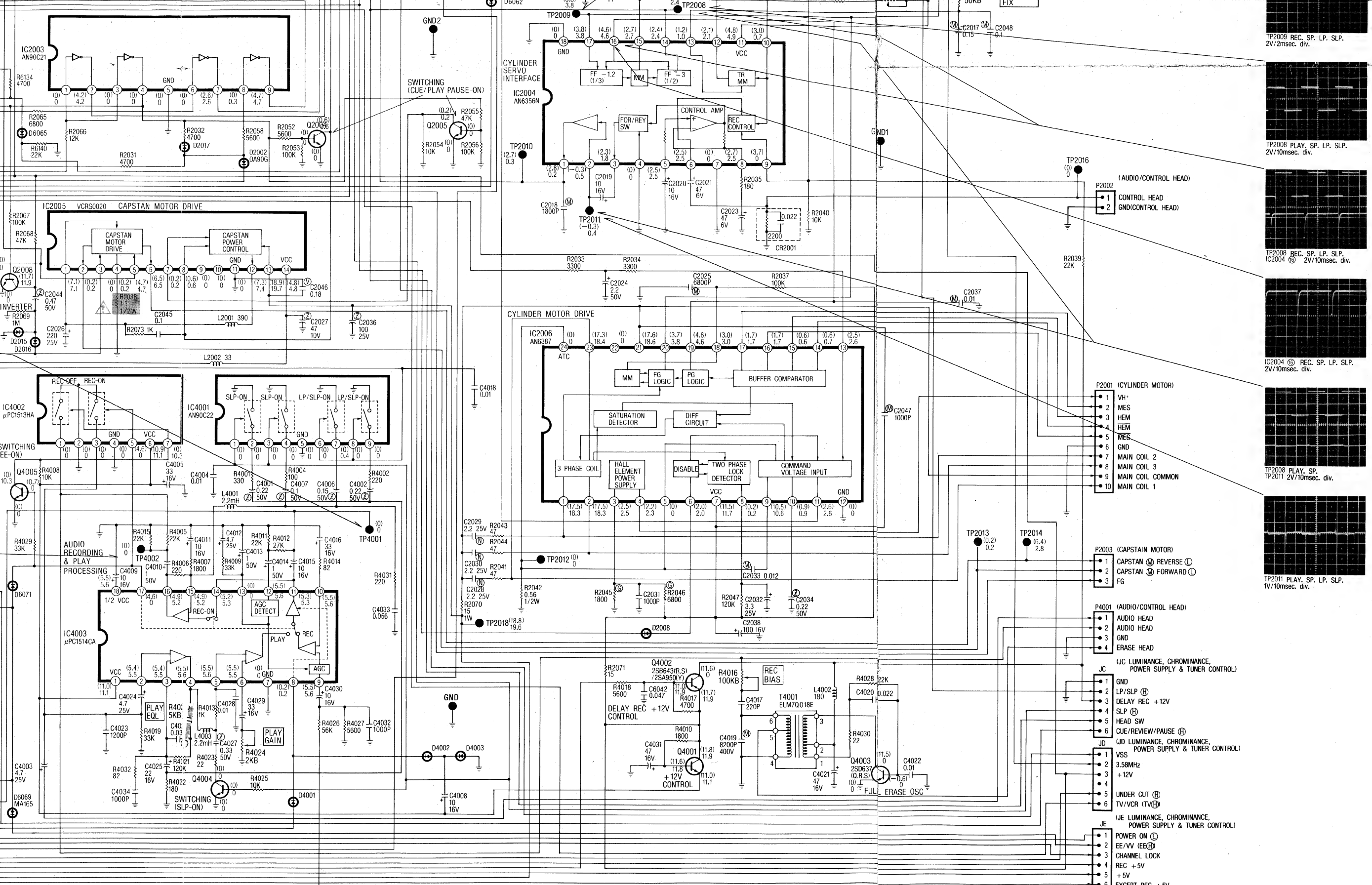
TP6006 STOP.  
2V/0.5msec. div.



SERVO SECTION  
NOTE: REF. NO. ON C.B.A. IS PRINTED A  
EXAMPLE: C.B.A.---R2, REF. NO. 21  
SCHEMATIC DIAGRAM  
(R2002 IS ABBREVIATED)







UNLESS OTHERWISE SPECIFIED:  
NPN TRANSISTORS ARE 2SD636 (Q.R.S.),  
PNP TRANSISTORS ARE 2SB641 (Q.R.S.),  
DIODES ARE MA165/1SS119 AND  
WATTAGE OF RESISTORS ARE 1/4W.

VJBS0232

**SERVO SECTION**  
NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.  
EXAMPLE: C.B.A.---R2, REF. NO. 2000 SERIES  
SCHEMATIC DIAGRAM---R4002  
(R2002 IS ABBREVIATED TO R2)

**AUDIO SECTION**  
NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.  
EXAMPLE: C.B.A.---R2, REF. NO. 4000 SERIES  
SCHEMATIC DIAGRAM---R4002  
(R4002 IS ABBREVIATED TO R2)

**SYSTEM CONTROL SECTION**  
NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.  
EXAMPLE: C.B.A.---R2, REF. NO. 6000 SERIES  
SCHEMATIC DIAGRAM---R6002  
(R6002 IS ABBREVIATED TO R2)

(SCHEMATIC)

SYSTEM CONTROL SECTION	
Q6001	6-C
Q6002	6-C
Q6003	6-C
Q6004	4-C
Q6005	3-B
Q6006	3-B
Q6007	3-B
Q6008	3-B
Q6009	4-C
Q6010	6-B
Q6011	4-B
Q6012	4-B
Q6013	4-B
Q6014	4-C
Q6015	4-B
Q6016	5-C
Q6017	5-C
Q6018	3-B
Q6019	4-C
Q6020	6-F
Q6021	5-B
Q6023	4-G
Q6950	2-E

SERVO SECTION	
Q2001	8-F
Q2002	9-F
Q2003	11-F
Q2004	8-E
Q2005	9-E
Q2006	6-G
Q2008	6-D

AUDIO SECTION	
Q4001	10-B
Q4002	10-B
Q4003	11-A
Q4004	7-A
Q4005	6-C

IC6002 MATRIX CHART

4-3  
SYSTEM CONTROL CIRCUIT  
IC6002 MATRIX CHART

CHART [I] (KEY MATRIX)

SCAN OUT	DATA IN						
PIN NO.	25 (DATA 7)	26 (DATA 6)	27 (DATA 5)	28 (DATA 4)	29 (DATA 3)	30 (DATA 2)	31 (DATA 1)
50 (SCAN 4)	—	SAFETY TAB	CASSETTE DOWN	—	★POSITION(1) (SEE CHART [II])	★POSITION(2) (SEE CHART [II])	★POSITION(3) (SEE CHART [II])
49 (SCAN 3)	TIME SET	SELECT	MODE (NORMAL/PROG)	TIMER SET	OTR	PAUSE	—
48 (SCAN 2)	FF	REW	EJECT	STOP	PLAY	REC	—
47 (SCAN 1)	TV/VCR	COUNTER RESET	POWER	FRAME ADVANCE	SLP	LP/SLP	—

CHART[II] (MODE SWITCH POSITION CODE)

PIN NO. MODE SWITCH POSITION	★POSITION(1)	★POSITION(2)	★POSITION(3)
	29 (DATA 3)	30 (DATA 2)	31 (DATA 1)
PLAY	L	H	L
PAUSE	L	H	H
REVIEW	H	L	L
STOP	H	L	H
FF/REW	H	H	L

CHART[III] (SAFETY DEVICE)

	DATA IN		
PIN NO.	20 (DATA 11)	21 (DATA 10)	22 (DATA 9)
33 ①	DEW ②	REMOTE PAUSE ①	CYLINDER LOCK ① (FF/REW/UNDER CUT)
33 ②	TAKE UP PHOTO TR ①	SUPPLY PHOTO TR ①	SENSOR LED ①

VOLTAGE MEASUREMENT:  
1. CUE, REVIEW.  
COLOR BAR SIGNAL IN SLP MODE.  
2. OTHERS  
COLOR BAR SIGNAL IN SP MODE.

	STOP			REC			PLAY			CUE			REV		
	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C
Q2001	4.0	4.0	0.7	2.6	2.6	1.9	2.6	2.6	1.9	2.3	2.4	2.9	2.6	2.6	2.8
Q2002	0	-0.2	4.7	0	-0.2	4.6	0	0	4.7	0	-0.2	4.6	0	-0.2	4.6
Q2003	2.6	2.0	2.6	2.6	4.2	2.7	2.6	4.2	2.7	2.6	4.2	2.8	2.6	2.4	2.5
Q2004	0	0	0.6	0	0	0.6	0	0	0.6	0	0.7	0	0	0	0.6
Q2005	0	0	0	0	0	0.2	0	0	0.2	0	0.6	0	0	0	0.2
Q2006	0	0	4.6	0	0	4.6	0	0	4.6	0	0.6	0	0	0	4.6
Q2008	0	0	11.8	0	0	11.7	0	0	11.9	0	0.7	0	0	0	11.8

TP NO.	STOP	REC	PLAY	CUE	REV
TP2001	0	0	0	0	0
TP2002	0	0	0	3.8	3.8
TP2003	0	0	0	3.8	3.8
TP2004	2.4	2.6	2.6	2.6	2.6
TP2005	0.2	2.5	2.5	2.5	2.5
TP2006	0.2	2.5	2.5	4.8	2.5
TP2007	2.5	2.7	2.7	2.5	2.4
TP2008	0	2.4	2.4	2.4	2.4
TP2009	4.8	3.8	3.8	3.7	3.8
TP2010	0	2.7	0.3	0.5	0.5
TP2011	0.5	-0.3	0.4	-0.5	-0.5
TP2012	0	0	0	0	0
TP2013	14.4	0.2	0.2	0.3	2.7
TP2014	14.4	6.4	2.8	17.7	0.2
TP2015	4.7	4.7	4.7	0	0
TP2016	0	0	0	0	0
TP2017	2.7	3.0	2.7	2.7	2.7
TP2018	19.6	18.8	19.6	19.3	19.7

	STOP			FF			REW			REC			PLAY			CUE			REV		
	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C
Q6001	-27.8	-27.6	6.6	-27.8	-27.6	6.6	-27.8	-27.6	6.6	-27.8	-27.6	6.6	-27.8	-27.6	6.6	-27.9	-27.7	6.5	-27.8	-27.6	6.5
Q6002	-26.0	-25.8	6.6	-26.0	-25.8	6.6	-26.0	-25.8	6.6	-26.0	-25.8	6.6	-26.1	-25.8	6.6	-26.1	-25.9	6.6	-26.1	-25.8	6.6
Q6003	-26.0	-25.8	6.6	-26.0	-25.8	6.6	-26.0	-25.8	6.6	-26.0	-25.8	6.6	-26.1	-25.8	6.6	-26.1	-25.9	6.6	-26.1	-25.8	6.6
Q6004	0	0	6.6	0	0	6.6	0	0	6.6	0	0	6.6	0	0	6.6	0	0	6.5	0	0	6.6
Q6005	0.9	0.6	1.6	0.9	0.6	1.6	0.9	0.6	1.6	0.9	0.6	1.6	0.9	0.6	1.6	0.9	0.6	1.6	0.9	0.6	1.5
Q6006	0.9	1.6	0.9	0.9	1.6	0.9	0.9	1.6	0.9	0.9	1.6	0.9	0.9	1.6	0.9	0.9	1.6	0.9	0.9	1.6	0.9
Q6007	6.4	6.5	0	6.4	6.5	0	6.4	6.5	0	1.7	4.7	0	1.7	4.7	0	1.7	4.6	0	6.5	6.5	0
Q6008	0	0	19.5	0	0	19.2	0	0	19.2	0	0	18.7	0	0	19.4	0	0	19.0	0	0	19.5
Q6009	0.3	0.4	4.5	0.3	0.4	4.5	0.3	0.4	4.5	0.3	0.4	4.5	0.3	0.4	4.5	0.3	0.4	4.4	0.3	0.3	4.5
Q6010	0	0.5	4.2	0	0.5	4.2	0	0.5	4.2	0	0.5	4.2	0	0.5	4.1	0	0.5	4.1	0	0.5	4.1
Q6011	5.0	5.0	0.6	5.0	5.0	0.7	5.0	5.0	0.6	5.0	4.3	4.9	5.0	5.0	0.6	5.0	5.2	0.6	5.0	5.2	0.6
Q6012	5.0	4.3	5.0	5.0	4.3	5.0	5.0	4.3	5.0	5.0	4.3	5.0	5.0	4.3	5.0	5.0	4.3	5.0	5.0	4.3	5.0
Q6013	0	0	5.0	0	0	5.0	0	0	5.0	0	0	4.3	0	0	5.0	6.3	5.8	5.3	6.3	5.8	5.3
Q6014	0	0.3	9.0	0	0.3	9.0	0	0.3	9.0	0	0.3	9.0	0	0.3	9.0	0	0.3	9.0	0	0.3	9.0
Q6015	0	0.2	2.1	0	0.2	2.1	0	0.2	2.1	0	0	3.1	0	0	3.1	0	0	3.1	0	0	3.1
Q6016	0	0.8	0	0	0.8	0	0	0.8	0	0	0.8	0	0	0.8	0	0	0.6	3.1	0	0.5	2.5
Q6017	0	0	0.9	0	0	0.9	0	0	0.9	0	0	4.3	0	0	0.9	0	0.7	0	0	0.7	0
Q6018	0	0	0.6	0	0	0.7	0	0	0.7	0	0	4.9	0	0	0.6	0	0	0.6	0	0	0.6
Q6019	0	0.2	0.8	0	0.2	3.7	0	0.2	3.7	0	0.7	0	0	0.7	0	0	0.7	0	0	0.7	0
Q6020	0.2	★	0	0.2	★	0	0.3	★	0	0.2	★	0	0.2	★	0	0.4	★	0	0.3	★	0
Q6021	0	0	6.6	0	0	6.6	0	0	6.6	0	0	6.6	0	0	6.6	0	0	6.5	0	0.2	6.5
Q6023	5.0	5.1	-0.6	4.9	5.1	-0.6	4.9	5.1	-0.7	4.9	5.3	-0.5	4.9	5.2	-0.5	4.9	5.2	0.4	4.9	5.3	0.3
Q6950	6.7	7.3	18.0	6.7	7.3	17.8	6.7	7.3	17.7	6.6	7.3	17.0	6.7	7.3	17.7	6.7	7.3	17.3	6.7	7.3	17.9


TP NO.	STOP	REC	PLAY
TP4001	0	0	0
TP4002	0	0	0

TP NO.	STOP	FF	REW	REC	PLAY	CUE	REV
TP6001	0.7	0.7	0.7	0.7	0.7	0.7	0.7
TP6002	6.6	6.6	6.6	6.6	6.6	6.6	6.6
TP6003	4.5	2.3	2.3	★	★	★	★
TP6004	4.2	4.2	4.2	4.2	4.2	4.1	4.1
TP6005	4.5	4.5	4.5	4.5	4.5	4.4	4.5
TP6006	1.2	1.2	1.2	1.2	1.2	1.2	1.2

	STOP			REC			PLAY		
	E	B	C	E	B	C	E	B	C
Q4001	11.0	11.7	11.8	11.0	11.6	11.8	11.1	11.8	11.9
Q4002	11.9	11.8	0	11.7	11.0	11.6	11.9	11.9	0
Q4003	0	0	0	0	-0.6	11.5	0	0	0
Q4004	0	0	0	0	0	0	0	0	0
Q4005	0	0.7	0	0	0.7	0	0	0	10.3



SERVO, AUDIO & SYSTEM CONTROL C.B.A. VEPS0232A1

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VOLTAGE MEASUREMENT: COLOR BAR SIGNAL IN SP REC MODE.

JA

1	AUDIO
2	AUDIO
3	REMOTE PAUSE
4	4 MODE REMOTE

JB

1	AC 4.2V
2	AC 4.2V
3	-28V
4	+5V
5	UNREG +18V
6	UNSWITCH +12V(2)
7	GND (POWER)

JC

1	GND
2	LP/SLP (H)
3	DELAY REC +12V
4	SLP (H)
5	HEAD SW
6	CUE/REVIEW/PAUSE (H)

JD

1	VSS
2	3.58MHz
3	+12V
4	
5	UNDER CUT (H)
6	TV/VCR (TVH)

JE

1	POWER ON (L)
2	EE/VV (EEH)
3	CHANNEL LOCK
4	REC + 5V
5	+5V
6	EXCEPT REC +5V

P2002

1	CONTROL HEAD
2	GND(CONTROL HEAD)

P2001

1	VH+
2	MES
3	HEM
4	HEM
5	MES
6	GND
7	MAIN COIL 2
8	MAIN COIL 3
9	MAIN COIL COMMON
10	MAIN COIL 1

P2003

1	CAPSTAN (M) REVERSE (L)
2	CAPSTAN (M) FORWARD (L)
3	FG

P6001

1	SEGMENT h
2	SEGMENT i
3	SEGMENT g
4	SEGMENT f
5	SEGMENT e
6	SEGMENT d
7	SEGMENT c
8	SEGMENT b
9	SEGMENT a
10	

P6002

1	GRID 1G
2	GRID 2G
3	GRID 3G
4	GRID 4G
5	GRID 5G
6	GRID 6G
7	GRID 7G

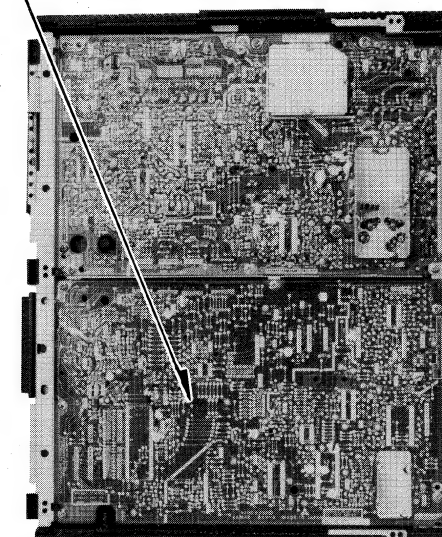




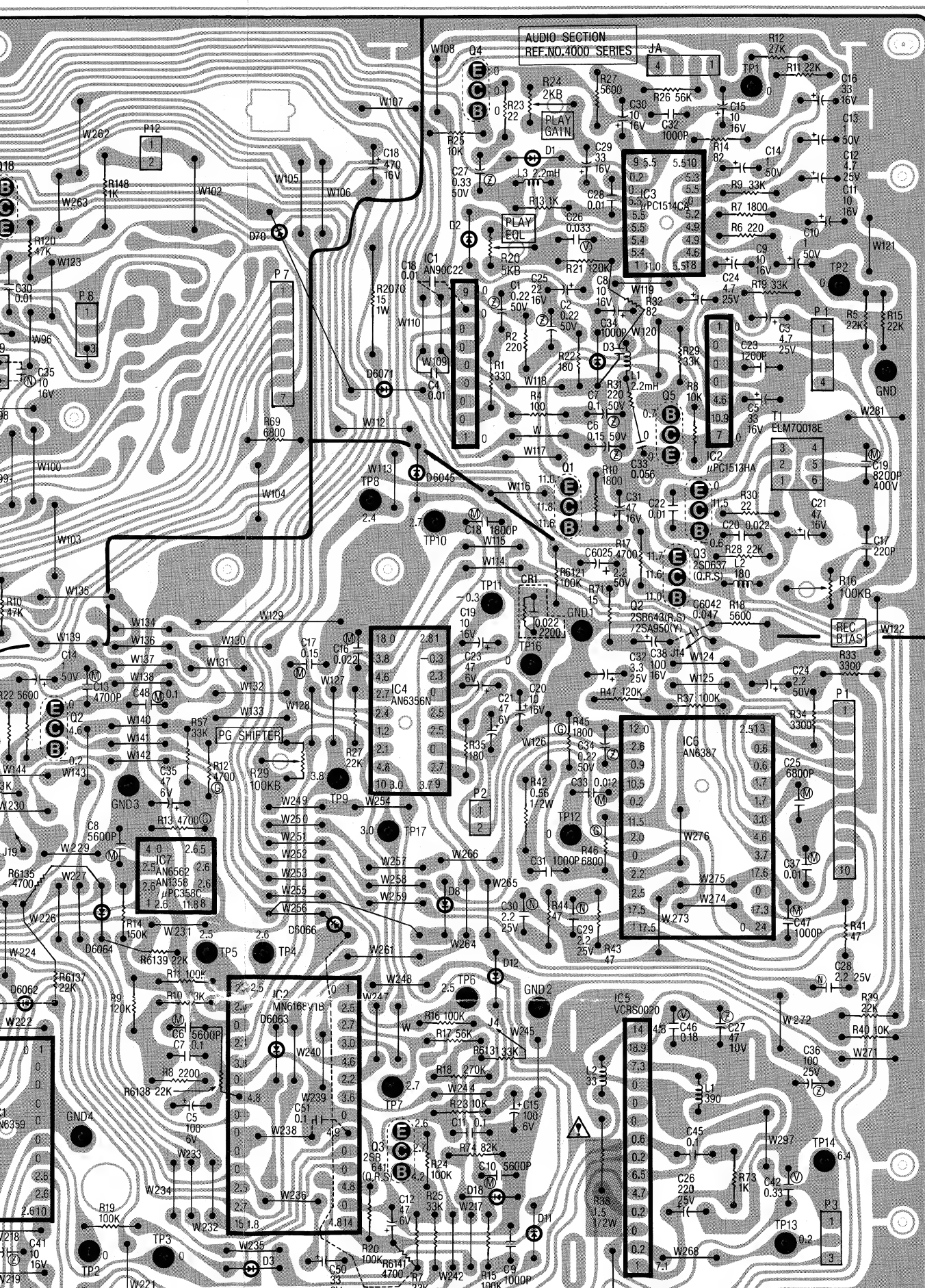
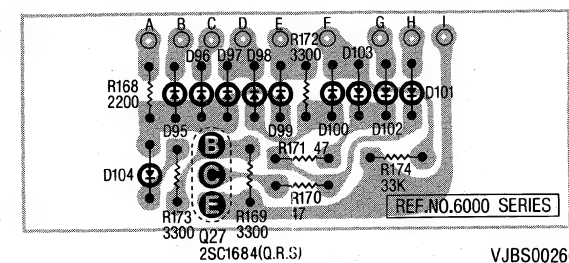
VOLTAGE MEASUREMENT: COLOR BAR SIGNAL  
IN SP REC MODE.

SERVO,AUDIO  
& SYSTEM CONTROL C.B.A.

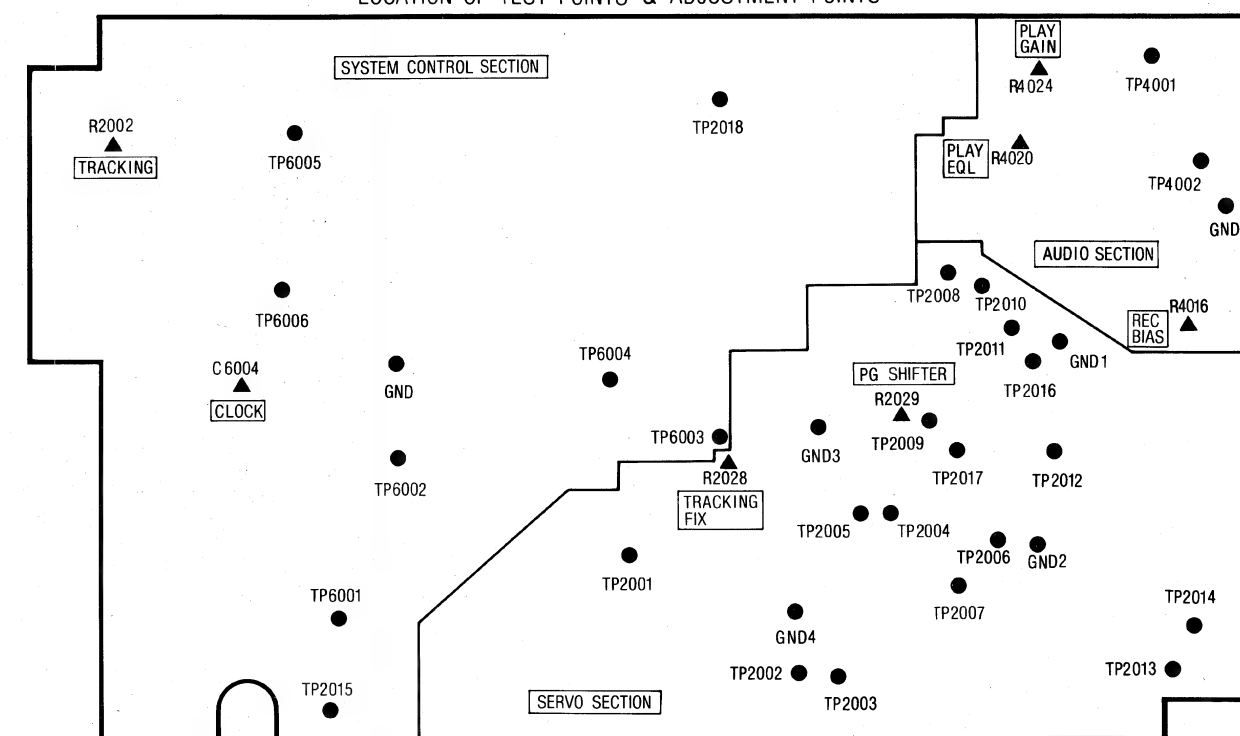
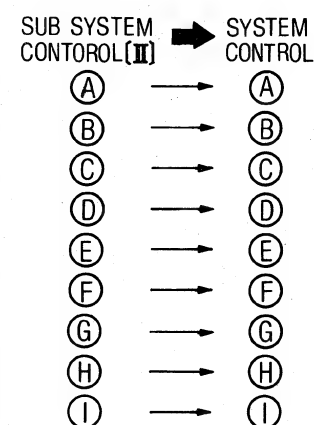
4-5  
SERVO, AUDIO & SYSTEM  
CONTROL C.B.A.



**SUB SYSTEM CONTROL (II) C.B.A.  
VEKS1333**



### LOCATION OF TEST POINTS & ADJUSTMENT POINTS



SERVO SECTION	
Q1	5-B
Q2	6-C
Q3	7-B
Q4	5-B
Q5	5-B
Q6	5-B
Q8	5-C

AUDIO SECTION	
Q1	8-D
Q2	8-D
Q3	8-D
Q4	7-E
Q5	8-D

SYSTEM CONTROL SECTION	
Q1	2-D
Q2	3-D
Q3	3-D
Q4	4-C
Q5	2-E
Q6	3-E
Q7	4-D
Q8	5-D
Q9	3-E
Q10	3-D
Q11	2-D
Q12	2-E
Q13	3-E
Q14	3-E
Q15	3-D
Q16	4-F

PIN NO.	IC6002						
	STOP	FF	REW	REC	PLAY	CUE	REV
PIN 1	0	0	0	0	0	0	0
PIN 2	0	0	0	0	0	0	0
PIN 3	0	0	0	0	0	0	0
PIN 4	6.4	6.4	0	6.4	6.5	6.4	0.2
PIN 5	6.6	0	6.5	0	0	0.2	6.5
PIN 6	0	0	0	0	0	6.5	6.5
PIN 7	0.2	6.6	6.6	0	0	0	0
PIN 8	6.5	0.2	0.2	0.2	0.2	0.2	6.4
PIN 9	0.2	0.2	0.2	6.4	6.4	6.4	6.5
PIN10	6.6	6.6	6.6	6.6	6.6	6.5	6.6
PIN11	6.6	6.6	6.6	6.6	6.6	6.5	6.6
PIN12	6.6	6.6	6.6	6.6	6.6	6.6	6.6
PIN13	0	0	0	0	0	0	0
PIN14	6.4	6.4	6.4	6.4	0	0	0
PIN15	0	0	0	0	0	6.3	6.2
PIN16	6.6	6.6	6.6	6.4	6.4	6.3	6.6
PIN17	0	0	0	0	0	0	0
PIN18	6.6	6.6	6.6	6.6	6.6	6.5	6.5
PIN19	2.5	2.5	2.5	2.5	2.5	2.5	2.5







Diagram illustrating the mapping from SUB SYSTEM CONTROL to SYSTEM CONTROL:

SUB SYSTEM CONTROL	SYSTEM CONTROL
①	①
②	②
③	③
④	④
⑤	⑤
⑥	⑥

[illegible]

PIN NO.	IC4003		
	STOP	REC	PLAY
PIN 1	11.0	11.0	11.1
PIN 2	5.4	5.4	5.5
PIN 3	5.5	5.4	5.5
PIN 4	5.5	5.5	5.6
PIN 5	5.5	5.5	5.6
PIN 6	5.5	5.5	5.5
PIN 7	0	0	0
PIN 8	0.2	0.2	0.2
PIN 9	5.5	5.5	5.6
PIN10	5.6	5.5	5.6
PIN11	5.3	5.3	5.3
PIN12	5.5	5.5	5.6
PIN13	1.9	0	0
PIN14	5.3	5.2	5.3
PIN15	5.0	4.9	5.2
PIN16	4.9	4.9	5.2
PIN17	4.6	4.6	0
PIN18	5.6	5.5	5.6


PIN 2	0	0	0	0	0	0	0
PIN 3	0	0	0	0	0	0	0
PIN 4	6.4	6.4	0	6.4	6.5	6.4	0.2
PIN 5	6.6	0	6.5	0	0	0.2	6.5
PIN 6	0	0	0	0	0	6.5	6.5
PIN 7	0.2	6.6	6.6	0	0	0	0
PIN 8	6.5	0.2	0.2	0.2	0.2	0.2	6.4
PIN 9	0.2	0.2	0.2	6.4	6.4	6.4	6.5
PIN10	6.6	6.6	6.6	6.6	6.6	6.5	6.6
PIN11	6.6	6.6	6.6	6.6	6.6	6.5	6.6
PIN12	6.6	6.6	6.6	6.6	6.6	6.6	6.6
PIN13	0	0	0	0	0	0	0
PIN14	6.4	6.4	6.4	6.4	0	0	0
PIN15	0	0	0	0	0	6.3	6.2
PIN16	6.6	6.6	6.6	6.4	6.4	6.3	6.6
PIN17	0	0	0	0	0	0	0
PIN18	6.6	6.6	6.6	6.6	6.6	6.5	6.5
PIN19	2.5	2.5	2.5	2.5	2.5	2.5	2.5
PIN20	1.4	1.9	1.9	1.9	1.9	1.9	1.9
PIN21	3.4	3.4	3.4	3.4	3.4	3.3	3.4
PIN22	2.1	2.0	2.1	3.1	3.1	3.1	3.1
PIN23	6.6	6.6	6.6	6.6	6.6	6.5	6.6
PIN24	1.2	1.2	1.2	1.2	1.2	1.2	1.2
PIN25	0	0	0	0	0	0.6	0
PIN26	0	0	0	0	0	0	0.6
PIN27	0	0	0	0	0	0	0
PIN28	0	0	0	0	0	0	0
PIN29	4.2	0	0	0.6	0.6	0.7	0.8
PIN30	0.3	3.2	3.2	3.2	3.2	3.3	0.8
PIN31	3.2	3.2	3.2	0.8	0.8	0.8	3.1
PIN32	4.5	2.3	2.3	★	★	★	★
PIN33	0.7	0.7	0.7	0.7	0.7	0.7	0.7
PIN34	0.2	0.2	0.2	0.2	0.2	0.2	0.2
PIN35	5.0	5.0	5.0	0.2	5.0	5.2	5.2
PIN36	11.8	11.8	11.8	0.3	11.8	11.8	11.8
PIN37	-27.9	-27.9	-27.9	-27.9	-27.9	-28.0	-27.9
PIN38	-27.9	-27.9	-27.9	-27.9	-27.9	-28.0	-27.9
PIN39	-27.9	-27.9	-27.9	-27.9	-27.9	-28.0	-27.9
PIN40	-27.9	-27.9	-27.9	-27.9	-27.9	-28.0	-27.9
PIN41	-27.9	-27.9	-27.8	-27.9	-27.9	-28.0	-27.9
PIN42	-27.9	-27.9	-27.8	-27.9	-27.9	-28.0	-27.9
PIN43	-27.9	-27.9	-27.8	-27.9	-27.9	-27.9	-27.9
PIN44	-27.9	-27.9	-27.8	-27.9	-27.9	-27.9	-27.9
PIN45	-27.9	-27.8	-27.8	-27.9	-27.9	-28.0	-27.9
PIN46	-27.9	-27.9	-27.8	-27.9	-27.9	-28.0	-27.9
PIN47	-27.6	-27.6	-27.6	-27.5	-27.6	-27.6	-27.6
PIN48	-25.8	-25.8	-25.8	-25.8	-25.8	-25.9	-25.8
PIN49	-25.8	-25.8	-25.8	-25.8	-25.8	-25.9	-25.8
PIN50	-26.1	-26.1	-26.1	-26.1	-26.1	-26.2	-26.1
PIN51	-26.1	-26.1	-26.1	-26.1	-26.1	-26.2	-26.1
PIN52	★	★	★	★	★	★	★
PIN53	-27.0	-27.0	-23.4	-23.4	-23.5	-23.5	-23.5
PIN54	★	★	★	★	★	★	★
PIN55	★	★	★	★	★	★	★
PIN56	★	★	★	★	★	★	★
PIN57	★	★	★	★	★	★	★
PIN58	★	★	★	★	★	★	★
PIN59	★	★	★	★	★	★	★
PIN60	★	★	★	★	★	★	★
PIN61	-29.5	-29.5	-29.5	-29.5	-29.6	-29.6	-29.5
PIN62	2.8	2.8	2.8	2.8	2.8	2.8	2.8
PIN63	3.2	3.2	3.2	3.1	3.2	3.1	3.1
PIN64	6.6	6.6	6.6	6.6	6.6	6.5	6.6

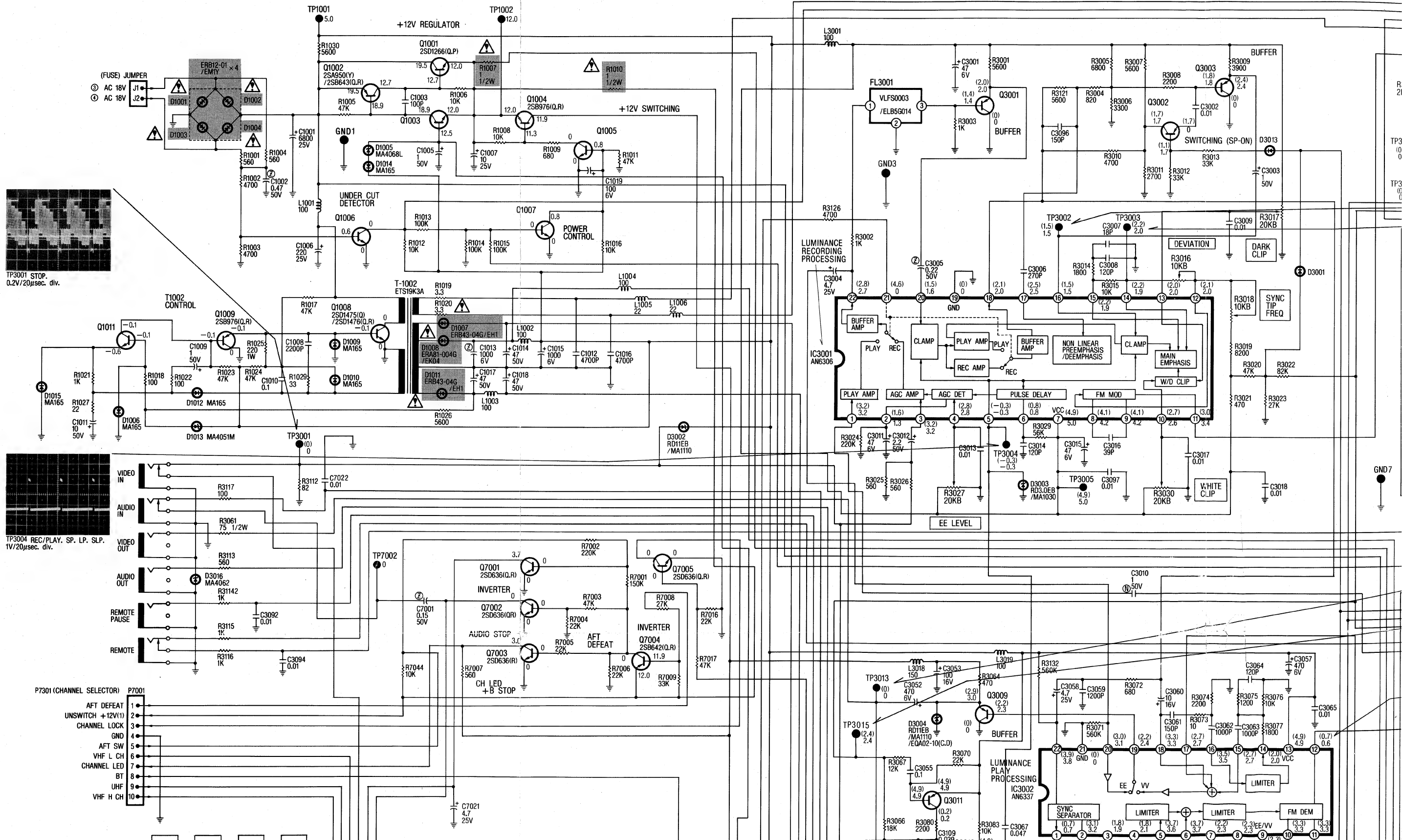
VOLTAGE MEASUREMENT:


1. CUE, REVIEW.  
COLOR BAR SIGNAL IN SLP MODE.
2. OTHERS  
COLOR BAR SIGNAL IN SP MODE.

★ : UNMEASURABLE OR UNNECESSARY TO MEASURE.

# LUMINANCE, CHROMINANCE, POWER SUPPLY & TUNER CONTROL SCHEMATIC DIAGRAM

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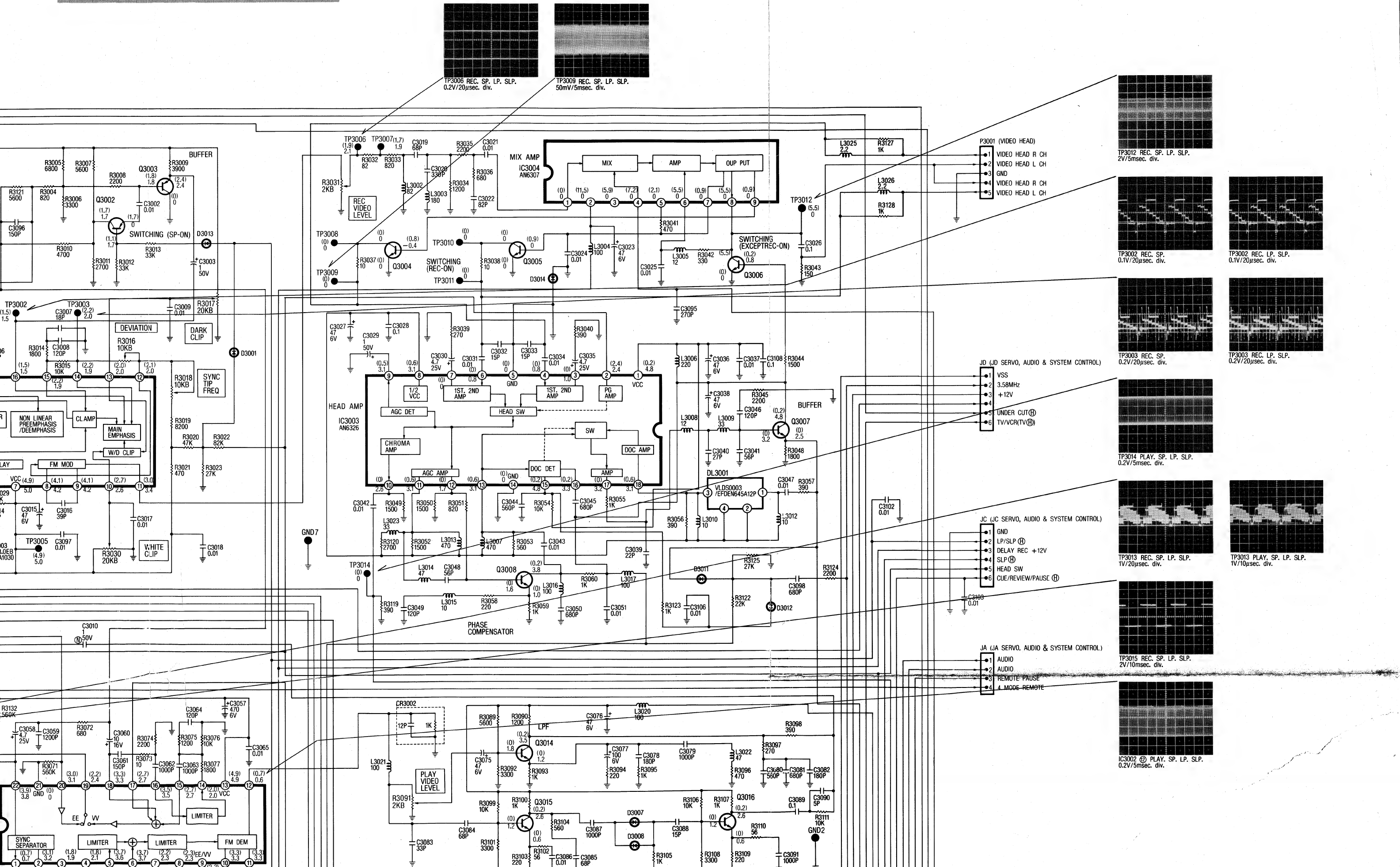


**IMPORTANT SAFETY NOTICE:**  
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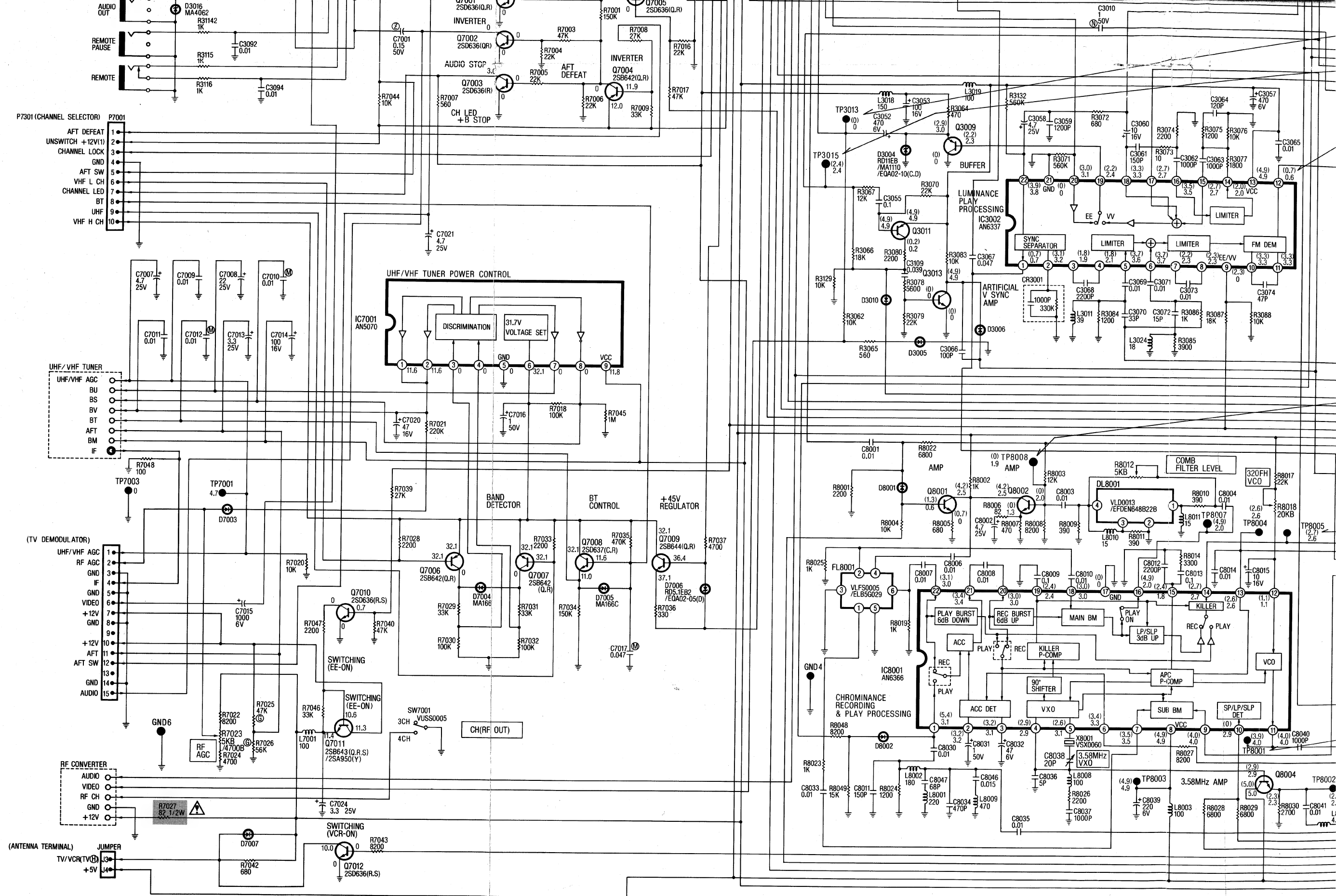
POWER SUPPLY & TUNER CONTROL SECTION  
VOLTAGE MEASUREMENT: COLOR BAR SIGNAL  
IN STOP MODE.

LUMINANCE & CHROMINANCE SECTION  
VOLTAGE MEASUREMENT:  
COLOR BAR SIGNAL IN SP REC MODE WITH BRACKET.  
COLOR BAR SIGNAL IN SP PLAY MODE WITHOUT BRACKET.

CALLOUTS NEXT TO WIRING PLUGS INDICATE CONNECTIONS TO OTHER SCHEMATIC DIAGRAM.





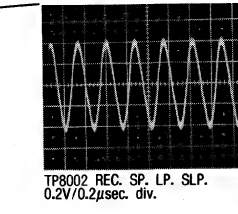
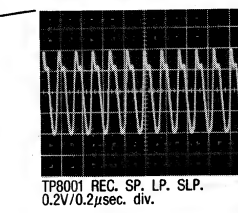
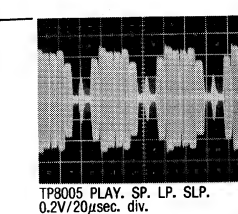
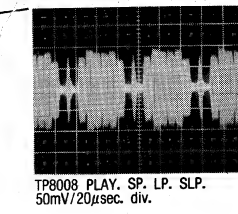
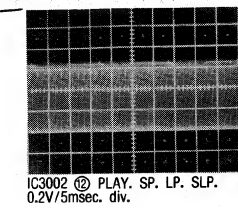
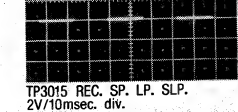
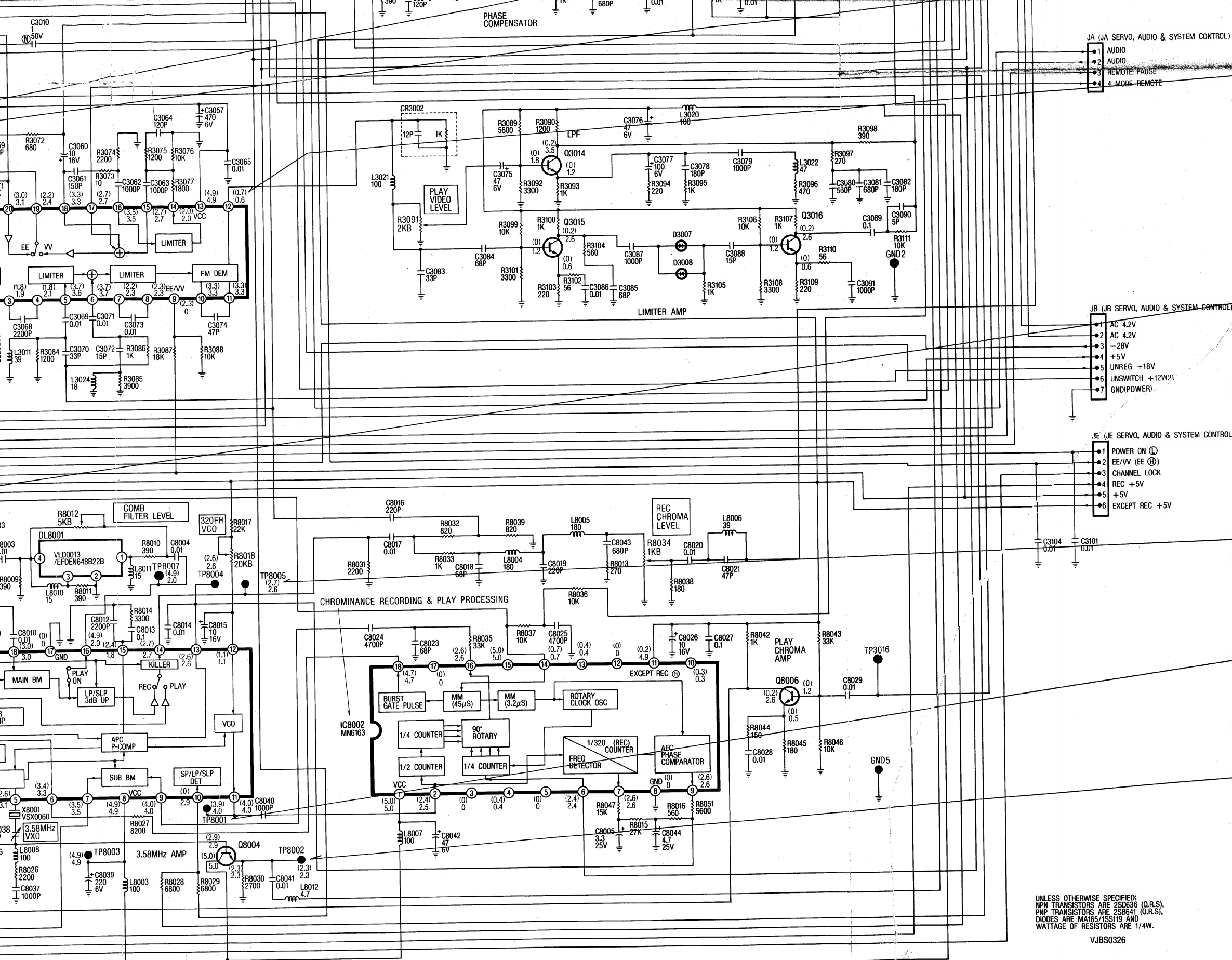


# TUNER CONTROL SECTION

NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.  
 EXAMPLE: C.B.A. R2, REF. NO. 7000 SERIES  
 SCHEMATIC DIAGRAM R7002  
 (R7002 IS ABBREVIATED TO R2)

# POWER SUPPLY SECTION

NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.  
 EXAMPLE: C.B.A. R2, REF. NO. 1000 SERIES  
 SCHEMATIC DIAGRAM R1002  
 (R1002 IS ABBREVIATED TO R2)



### POWER SUPPLY SECTION

NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.  
 EXAMPLE: C.B.A.---R2, REF. NO. 1000 SERIES  
 SCHEMATIC DIAGRAM---R1002  
 (R1002 IS ABBREVIATED TO R2)

### LUMINANCE SECTION


NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.  
 EXAMPLE: C.B.A.---R2, REF. NO. 3000 SERIES  
 SCHEMATIC DIAGRAM---R3002  
 (R3002 IS ABBREVIATED TO R2)

### CHROMINANCE SECTION

NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.  
 EXAMPLE: C.B.A.---R2, REF. NO. 8000 SERIES  
 SCHEMATIC DIAGRAM---R8002  
 (R8002 IS ABBREVIATED TO R2)



LUMINANCE, CHROMINANCE, POWER SUPPLY & TUNER CONTROL C.B.A. VEPS0326A1

IMPORTANT SAFETY NOTICE:  
COMPONENTS IDENTIFIED BY THE SIGN  HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE ORIGINALLY SPECIFIED PARTS.

POWER SUPPLY & TUNER  
VOLTAGE MEASUREMENTS

JA

1	AUDIO
2	AUDIO
3	REMOTE PAUSE
4	MODE REMOTE

JB

1	AC 4.2V
2	AC 4.2V
3	-28V
4	+5V
5	UNREG +18V
6	UNSWITCH +12V (2)
7	GND (POWER)

JC

1	GND
2	LP/SLP
3	DELAY REC +12V
4	SLP
5	HEAD SW
6	CUE/REVIEW/PAUSE

JD

1	VSS
2	3.58MHZ
3	+12V
4	
5	UNDER CUT
6	TV/VCR/TV

JE

1	POWER ON
2	EE/VV/EE
3	CHANNEL LOCK
4	REC +5V
5	+5V
6	EXCEPT REC +5V

P3001

1	VIDEO HEAD R CH
2	VIDEO HEAD L CH
3	GND
4	VIDEO HEAD R CH
5	VIDEO HEAD L CH

P7001

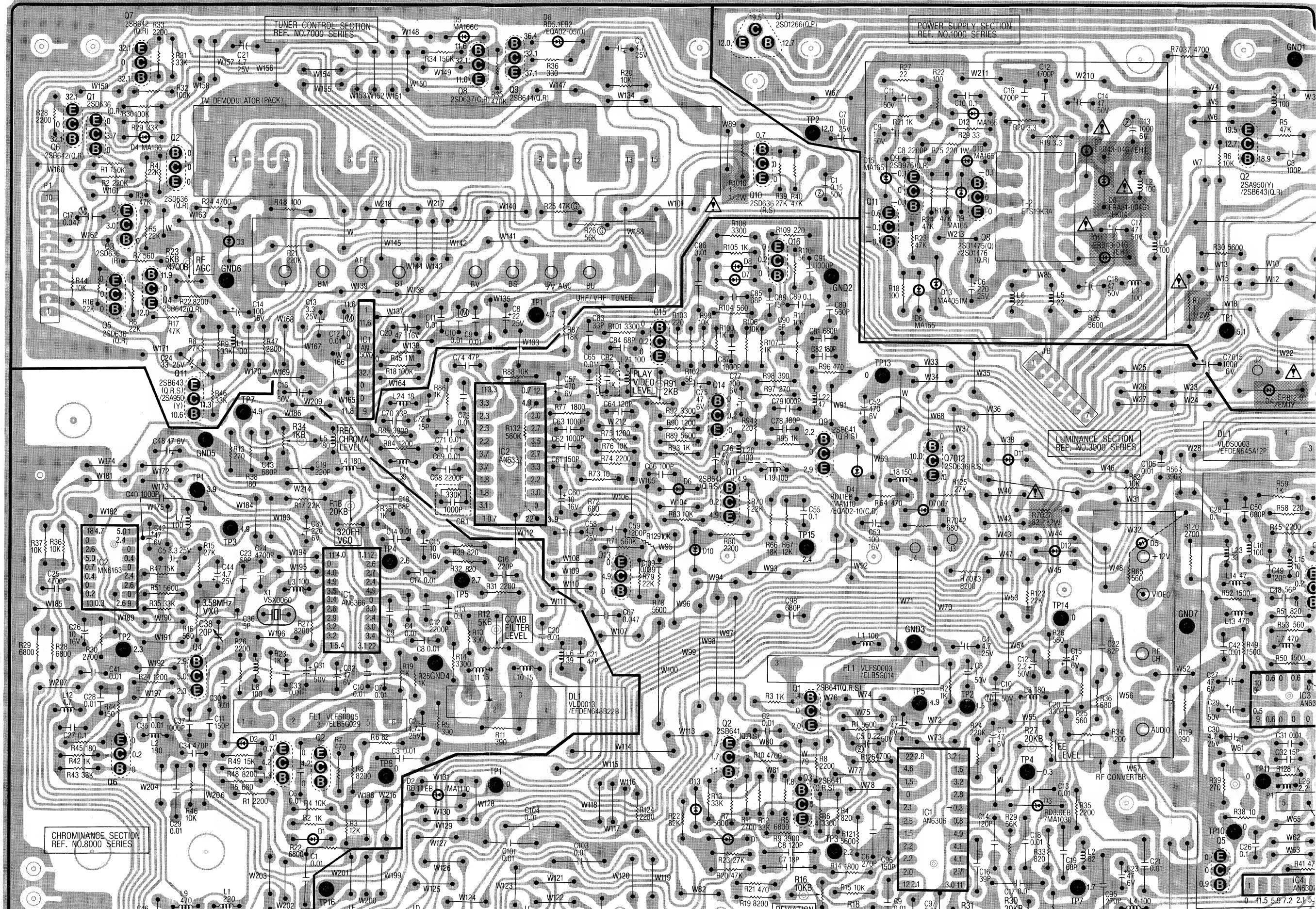
1	AFT DEFEAT
2	UNSWITCH +12V(1)
3	CHANNEL LOCK
4	GND
5	AFT SW
6	VHF L CH
7	CHANNEL LED
8	BT
9	UHF
10	VHF H CH

JUMPER

J1	AC 18V
J2	AC 18V

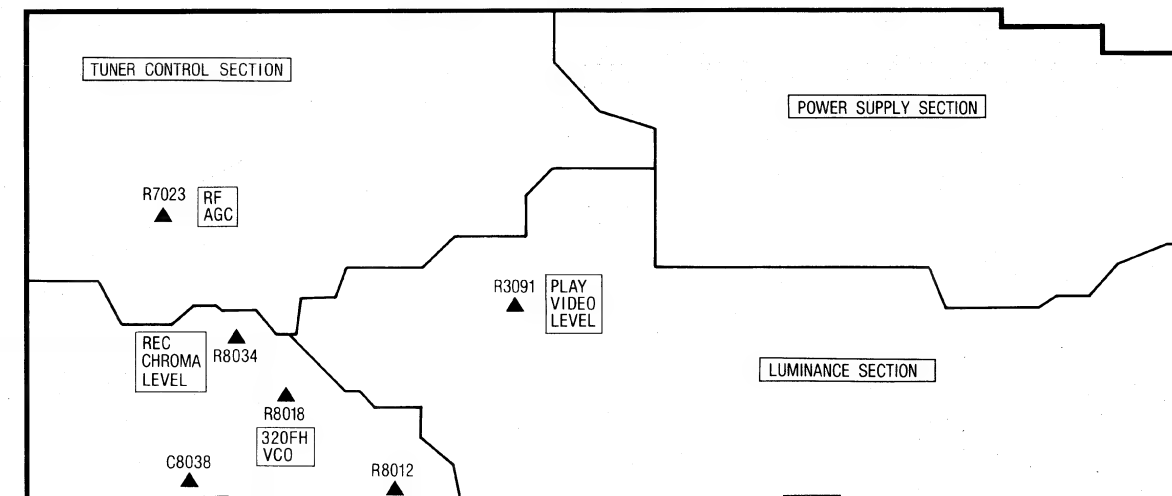
TV DEMODULATOR (PACK)

1	UHF/VHF AGC
2	RF AGC
3	GND
4	IF
5	GND
6	VIDEO
7	+12V
8	GND





4-7  
LUMINANCE, CHROMINANCE,  
POWER SUPPLY & TUNER  
CONTROL C.B.A.



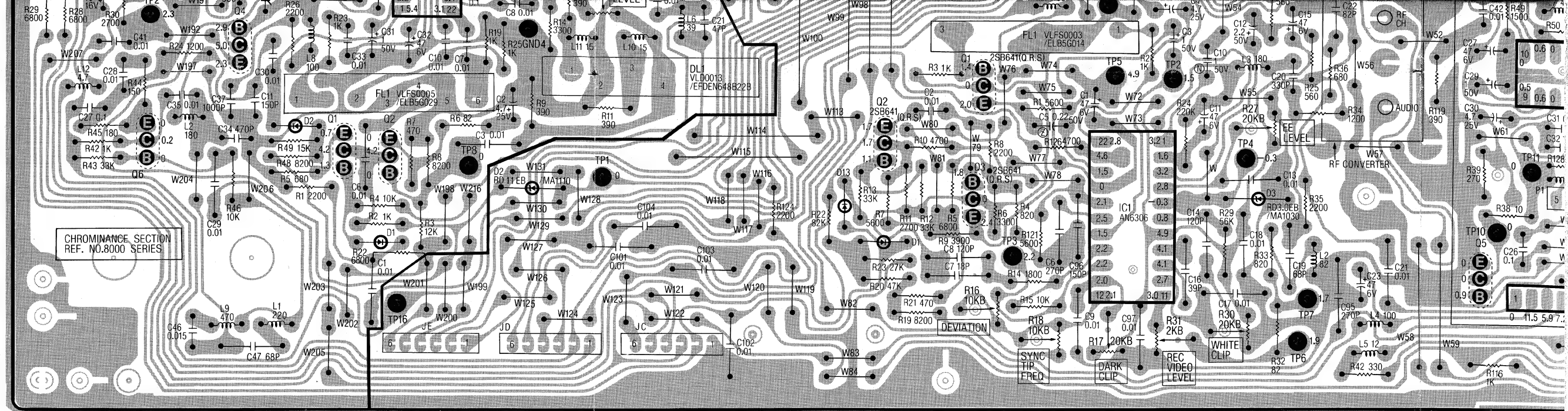


B

A

JUMPER	
J1	AC 18V
J2	AC 18V

TV DEMODULATOR (PACK)	
1	UHF/VHF AGC
2	RF AGC
3	GND
4	IF
5	GND
6	VIDEO
7	+12V
8	GND
9	
10	+12V
11	AFT
12	AFT SW
13	
14	GND
15	AUDIO



JUMPER	
J3	TV/VCR(TVⓈ)
J4	+5V

(SCHEMATIC)

POWER SUPPLY SECTION	
Q1001	3-H
Q1002	2-H
Q1003	3-G
Q1004	3-G
Q1005	3-G
Q1006	2-G
Q1007	3-G
Q1008	2-F
Q1009	2-F
Q1011	1-F

TUNER CONTROL SECTION	
Q7001	3-E
Q7002	3-E
Q7003	3-E
Q7004	4-E
Q7005	4-E
Q7006	3-B
Q7007	3-B
Q7008	4-B
Q7009	4-B
Q7010	2-B
Q7011	2-B
Q7012	2-A

LUMINANCE SECTION	
Q3001	5-H
Q3002	6-G
Q3003	7-H
Q3004	8-G
Q3005	8-G
Q3006	10-G
Q3007	10-F
Q3008	9-E
Q3009	5-E
Q3011	5-D
Q3013	5-D
Q3014	9-E
Q3015	9-D
Q3016	10-D

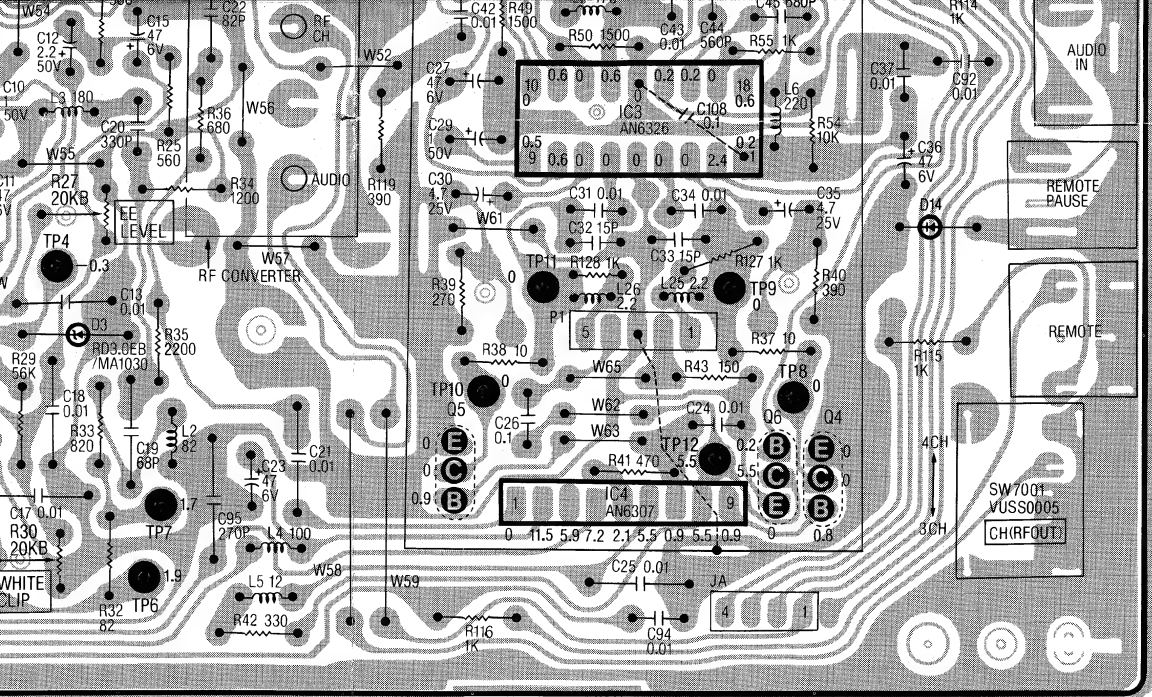
CHROMINANCE SECTION	
Q8001	5-C
Q8002	6-C
Q8004	7-A
Q8006	10-B

	STOP			REC			PLAY			CUE			REV		
	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C
Q3001	2.0	1.4	0	2.0	1.4	0	2.0	1.4	0	2.0	1.4	0	2.0	1.4	0
Q3002	1.7	1.1	1.7	1.7	1.1	1.7	0	1.7	1.7	0	1.7	1.7	-7.6	1.6	1.7
Q3003	2.4	1.8	0	2.4	1.8	0	2.4	1.8	0	2.4	1.8	0	2.4	1.8	0
Q3004	0	0	0	0	0.8	0	0	-0.4	0	0	-1.3	0	0	-0.5	0
Q3005	0	0	0	0	0.9	0	0	0	0	0	-1.4	0	0	0	0
Q3006	0	0.8	0	0	0.2	5.5	0	0.8	0	0	0.8	0	0	0.8	0
Q3007	2.5	3.2	4.8	0	0	0.2	2.5	3.2	4.8	2.5	3.2	4.8	2.5	3.2	4.8
Q3008	1.1	1.7	3.8	0	0	0.2	1.0	1.6	3.8	1.1	1.7	3.9	1.1	1.7	3.9
Q3009	2.9	2.2	0	2.9	2.2	0	3.0	2.3	0	3.0	2.3	0	3.0	2.3	0
Q3011	4.9	4.9	0	4.9	4.9	0.2	4.9	4.9	0.2	4.9	4.9	0.2	4.9	4.9	0
Q3013	0	0	4.9	0	0	4.9	0	0	4.9	0	0	4.7	0	4.7	0
Q3014	1.2	1.8	3.5	0	0	0.2	1.2	1.8	3.5	1.2	1.8	3.5	1.2	1.8	3.5
Q3015	0.6	1.2	2.6	0	0	0.2	0.6	1.2	2.6	0.6	1.2	2.6	0.6	1.2	2.6
Q3016	0.6	1.2	2.6	0	0	0.2	0.6	1.2	2.6	0.6	1.2	2.6	0.6	1.2	2.6

	STOP			REC			PLAY			CUE			REV		
	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C
Q8001	0	0.6	2.5	0.7	1.3	4.2	0	0.6	2.5	0	0.6	0	0	0.6	2.5
Q8002	1.3	2.0	2.5	0	0	4.2	1.3	2.0	2.5	1.3	1.9	2.5	1.3	1.9	2.5
Q8004	2.3	2.9	5.0	2.3	2.9	5.0	2.3	2.9	5.0	2.3	2.9	5.0	2.3	2.9	5.0
Q8006	0.5	1.1	2.5	0	0	0.2	0.5	1.2	2.6	0.5	1.1	2.5	0.5	1.1	2.5

PIN NO.	IC3001				
	STOP	REC	PLAY	CUE	REV
PIN 1	3.2	3.2	3.2	3.2	3.2
PIN 2	1.6	1.6	1.3	0.7	0.6
PIN 3	3.2	3.2	3.2	3.2	3.2
PIN 4	2.8	2.8	2.8	2.8	2.8
PIN 5	-0.3	-0.3	-0.3	-0.3	-0.3
PIN 6	0.8	0.8	0.8	0.8	0.8
PIN 7	5.0	4.9	5.0	4.9	4.9
PIN 8	4.1	4.1	4.2	4.2	4.2
PIN 9	4.1	4.1	4.2	4.2	4.2
PIN10	2.7	2.7	2.6	2.7	2.6
PIN11	3.0	3.0	3.4	3.4	3.4
PIN12	2.0	2.1	2.0	2.0	2.0
PIN13	2.0	2.0	2.0	2.0	2.0
PIN14	2.2	2.2	1.9	1.9	2.0
PIN15	2.2	2.2	1.9	1.9	2.0
PIN16	1.5	1.5	1.5	1.5	1.5
PIN17	2.5	2.5	2.5	2.5	2.5
PIN18	2.1	2.1	2.0	2.0	2.0
PIN19	0	0	0	0	0
PIN20	1.5	1.5	1.6	1.6	1.5
PIN21	4.6	4.6	0	0	0
PIN22	2.8	2.8	2.7	2.7	2.7

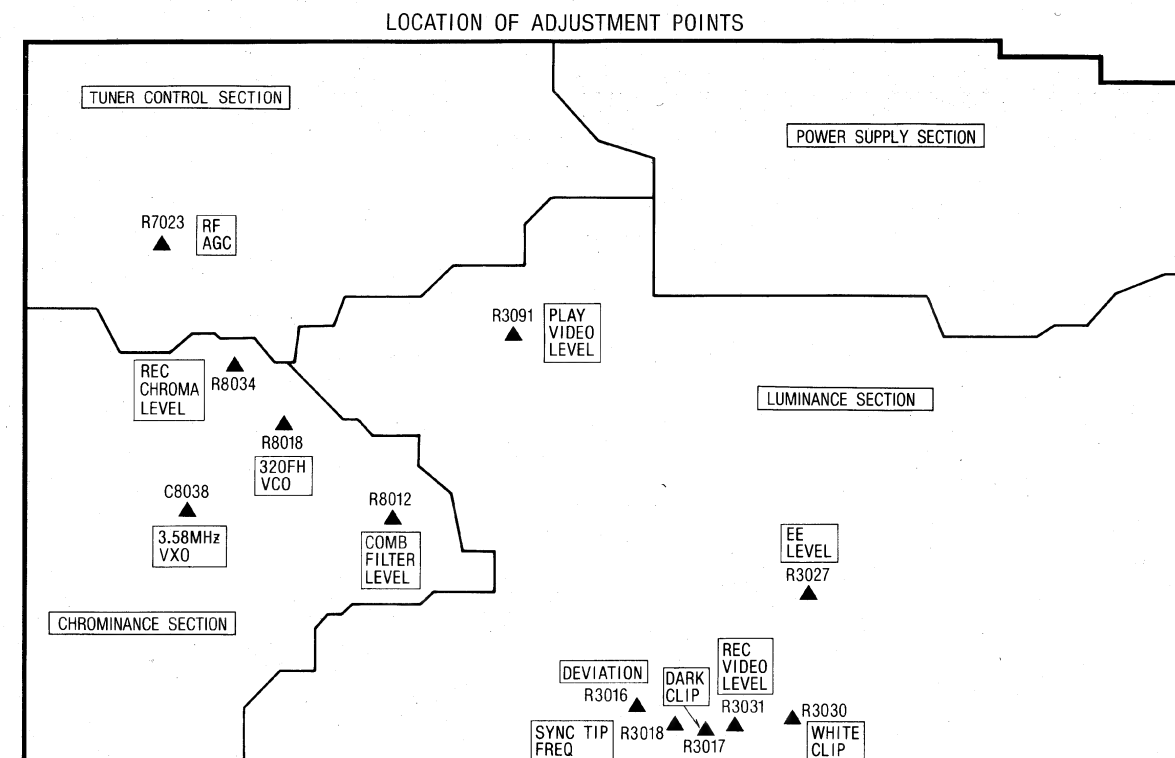
PIN NO.	IC3002			
	STOP	REC	PLAY	CUE
PIN 1	0.7	0.7	0.7	0.7
PIN 2	3.1	3.1	3.2	3.3
PIN 3	1.9	1.8	1.9	2.1
PIN 4	1.9	1.8	2.1	2.0
PIN 5	3.7	3.7	3.6	3.6
PIN 6	3.6	3.7	3.7	3.6
PIN 7	2.3	2.2	2.3	2.3
PIN 8	2.3	2.3	2.3	2.3
PIN 9	2.3	2.3	0	0
PIN10	3.3	3.3	3.3	3.3
PIN11	3.3	3.3	3.3	3.3
PIN12	0.6	0.7	0.6	0.6
PIN13	4.9	4.9	4.9	4.9
PIN14	2.0	2.0	2.0	2.0
PIN15	2.7	2.7	2.7	2.7
PIN16	3.4	3.5	3.5	3.4
PIN17	2.7	2.7	2.7	2.7
PIN18	3.3	3.3	3.3	3.2
PIN19	2.2	2.2	2.4	2.3
PIN20	3.0	3.0	3.1	3.1
PIN21	0	0	0	0
PIN22	3.8	3.9	3.8	3.8



UNLESS OTHERWISE SPECIFIED;  
TRANSISTORS ARE 2SD636 (Q.R.S.),  
DIODES ARE MA165/1SS119 AND  
WATTAGE OF RESISTORS ARE 1/4W.

Q4	8-E
Q5	8-E
Q6	8-D
Q7	8-E
Q8	6-E
Q9	5-E
Q11	5-E

TUNER CONTROL SECTION	
Q1	2-E
Q2	2-E
Q3	2-E
Q4	2-D
Q5	2-D
Q6	2-E
Q7	2-E
Q8	3-E
Q9	4-E
Q10	5-E
Q11	2-D
Q12	6-C



6 7 8

PIN NO.	STOP	REC	PLAY	CUE	REV
PIN 1	0.7	0.7	0.7	0.7	0.7
PIN 2	3.1	3.1	3.2	3.3	3.2
PIN 3	1.9	1.8	1.9	2.1	2.1
PIN 4	1.9	1.8	2.1	2.0	2.0
PIN 5	3.7	3.7	3.6	3.6	3.7
PIN 6	3.6	3.7	3.7	3.6	3.7
PIN 7	2.3	2.2	2.3	2.3	2.3
PIN 8	2.3	2.3	2.3	2.3	2.3
PIN 9	2.3	2.3	0	0	0
PIN10	3.3	3.3	3.3	3.3	3.3
PIN11	3.3	3.3	3.3	3.3	3.3
PIN12	0.6	0.7	0.6	0.6	0.6
PIN13	4.9	4.9	4.9	4.9	4.9
PIN14	2.0	2.0	2.0	2.0	2.0
PIN15	2.7	2.7	2.7	2.7	2.7
PIN16	3.4	3.5	3.5	3.4	3.4
PIN17	2.7	2.7	2.7	2.7	2.6
PIN18	3.3	3.3	3.3	3.2	3.2
PIN19	2.2	2.2	2.4	2.3	2.3
PIN20	3.0	3.0	3.1	3.1	3.1
PIN21	0	0	0	0	0
PIN22	3.8	3.9	3.8	3.8	3.8

PIN NO.	STOP	REC	PLAY	CUE	REV
PIN 1	4.8	0.2	4.8	4.8	4.8
PIN 2	0	2.4	2.4	2.4	2.4
PIN 3	0.9	0	1.0	1.0	0.9
PIN 4	0.7	0	0.8	0.7	0.7
PIN 5	0	0	0	0	0
PIN 6	0.8	0	0.8	0.8	0.7
PIN 7	0.9	0	0	1.0	1.0
PIN 8	3.1	0.6	3.1	3.1	3.1
PIN 9	2.9	0.5	3.1	3.0	3.1
PIN10	2.6	0	2.6	2.6	2.6
PIN11	3.1	0.6	3.1	3.1	3.1
PIN12	1.7	0	1.7	1.7	1.7
PIN13	3.1	0.6	3.1	3.1	3.1
PIN14	0	0	0	0	0
PIN15	2.0	0.2	4.8	4.6	4.5
PIN16	2.6	0.2	3.3	3.0	3.0
PIN17	3.2	0	3.2	3.2	3.2
PIN18	3.1	0.6	3.1	3.1	3.1

PIN NO.	STOP	REC	PLAY	CUE	REV
PIN1	0	0	0	0	0
PIN2	0	11.5	0	0	0
PIN3	0	5.9	0	0	0
PIN4	0	7.2	0	0	0
PIN5	0	2.1	0	0	0
PIN6	0	5.5	0	0	0
PIN7	0	0.9	0	0	0
PIN8	0	5.5	0	0	0
PIN9	-0.3	0.9	-0.1	-0.2	-0.2

TP NO.	STOP	REC	PLAY	CUE	REV
TP3001	0	0	0	0	0
TP3002	1.5	1.5	1.5	1.5	1.5
TP3003	2.2	2.2	2.0	1.9	2.0
TP3004	-0.3	-0.3	-0.3	-0.3	-0.3
TP3005	4.9	4.9	5.0	5.0	5.0
TP3006	1.9	1.9	2.1	2.1	2.1
TP3007	1.7	1.7	1.9	1.9	1.9
TP3008	0	0	0	0	0
TP3009	0	0	0	0	0
TP3010	0	0	0	0	0
TP3011	0	0	0	0	0
TP3012	0	5.5	0	0	0
TP3013	0	0	0	0	0
TP3014	0	0	0	0	0
TP3015	2.4	2.4	2.4	2.4	2.4
TP3016	0	0	0	0	0

PIN NO.	STOP	REC	PLAY	CUE	REV
PIN 1	3.1	5.4	3.1	3.0	3.1
PIN 2	3.1	3.2	3.2	3.2	3.1
PIN 3	3.1	3.2	3.1	3.1	3.1
PIN 4	2.9	2.9	2.9	2.9	2.9
PIN 5	3.1	2.6	3.1	3.1	3.1
PIN 6	3.3	3.4	3.3	3.3	3.3
PIN 7	3.5	3.5	3.5	3.5	3.5
PIN 8	4.9	4.9	4.9	4.9	4.9
PIN 9	4.0	4.0	4.0	4.0	4.0
PIN10	0	0	2.9	2.9	2.9
PIN11	4.0	4.0	4.0	4.0	4.0
PIN12	1.2	1.1	1.1	1.1	1.1
PIN13	2.6	2.6	2.6	2.6	2.5
PIN14	0	2.7	2.7	2.6	2.6
PIN15	1.8	2.4	1.8	1.8	1.8
PIN16	2.0	4.9	2.0	1.9	2.0
PIN17	0	0	0	0	0
PIN18	3.0	3.0	3.0	3.0	3.0
PIN19	2.9	2.4	2.4	2.5	2.6
PIN20	3.1	3.0	3.0	3.0	3.1
PIN21	3.4	3.4	3.4	3.4	3.4
PIN22	3.0	3.1	3.0	3.0	3.0

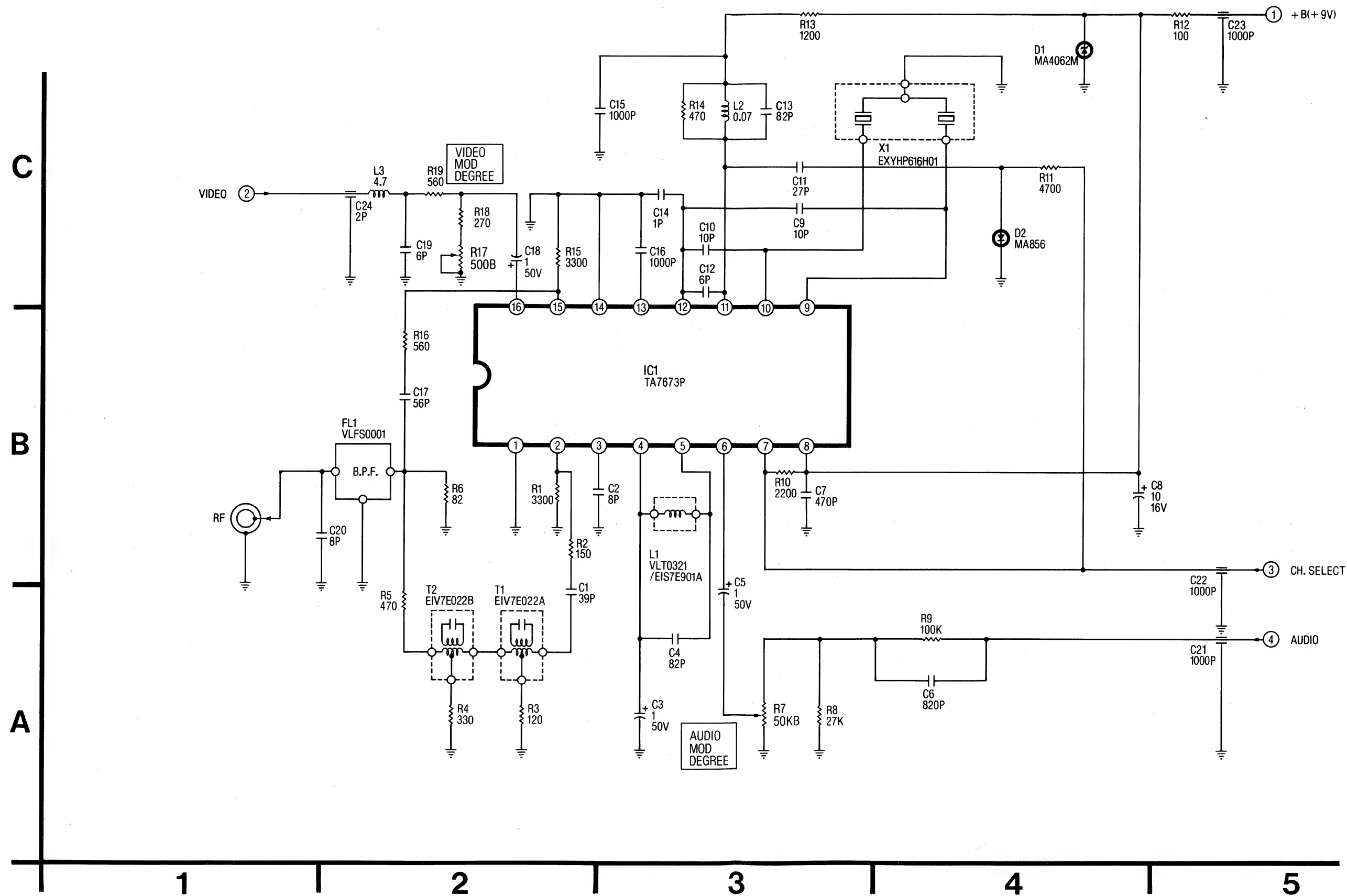
PIN NO.	STOP	REC	PLAY	CUE	REV
PIN 1	5.0	5.0	5.0	5.0	5.0
PIN 2	2.5	2.4	2.5	2.5	2.4
PIN 3	0	0	0	0	0
PIN 4	0.4	0.4	0.4	0.4	0.4
PIN 5	0	0	0	0	0
PIN 6	4.8	2.4	2.4	2.4	2.4
PIN 7	2.6	2.6	2.6	2.7	2.5
PIN 8	0	0	0	0	0
PIN 9	2.6	2.6	2.6	2.6	2.6
PIN10	0.2	0.3	0.3	0.5	0.6
PIN11	4.9	0.2	4.9	4.9	4.9
PIN12	0	0	0	0	0
PIN13	0	0.4	0.4	0.4	0.3
PIN14	0.7	0.7	0.7	0.7	0.7
PIN15	5.0	5.0	5.0	5.0	4.9
PIN16	2.6	2.6	2.6	2.6	2.6
PIN17	0	0	0	0	0
PIN18	4.7	4.7	4.7	4.7	4.9

TP NO.	STOP	REC	PLAY	CUE	REV
TP8001	4.0	3.9	4.0	0	4.0
TP8002	2.3	2.3	2.3	2.3	2.3
TP8003	4.9	4.9	4.9	4.9	4.9
TP8004	2.6	2.6	2.6	2.6	2.5
TP8005	0	2.7	2.6	2.7	2.6
TP8007	2.0	4.9	2.0	1.9	1.9
TP8008	1.9	0	1.9	2.0	1.9

VOLTAGE MEASUREMENT :  
1. CUE, REVIEW.  
COLOR BAR SIGNAL IN SLP MODE.  
2. OTHERS  
COLOR BAR SIGNAL IN SP MODE.

# RF CONVERTER SCHEMATIC DIAGRAM (VEQS0206)

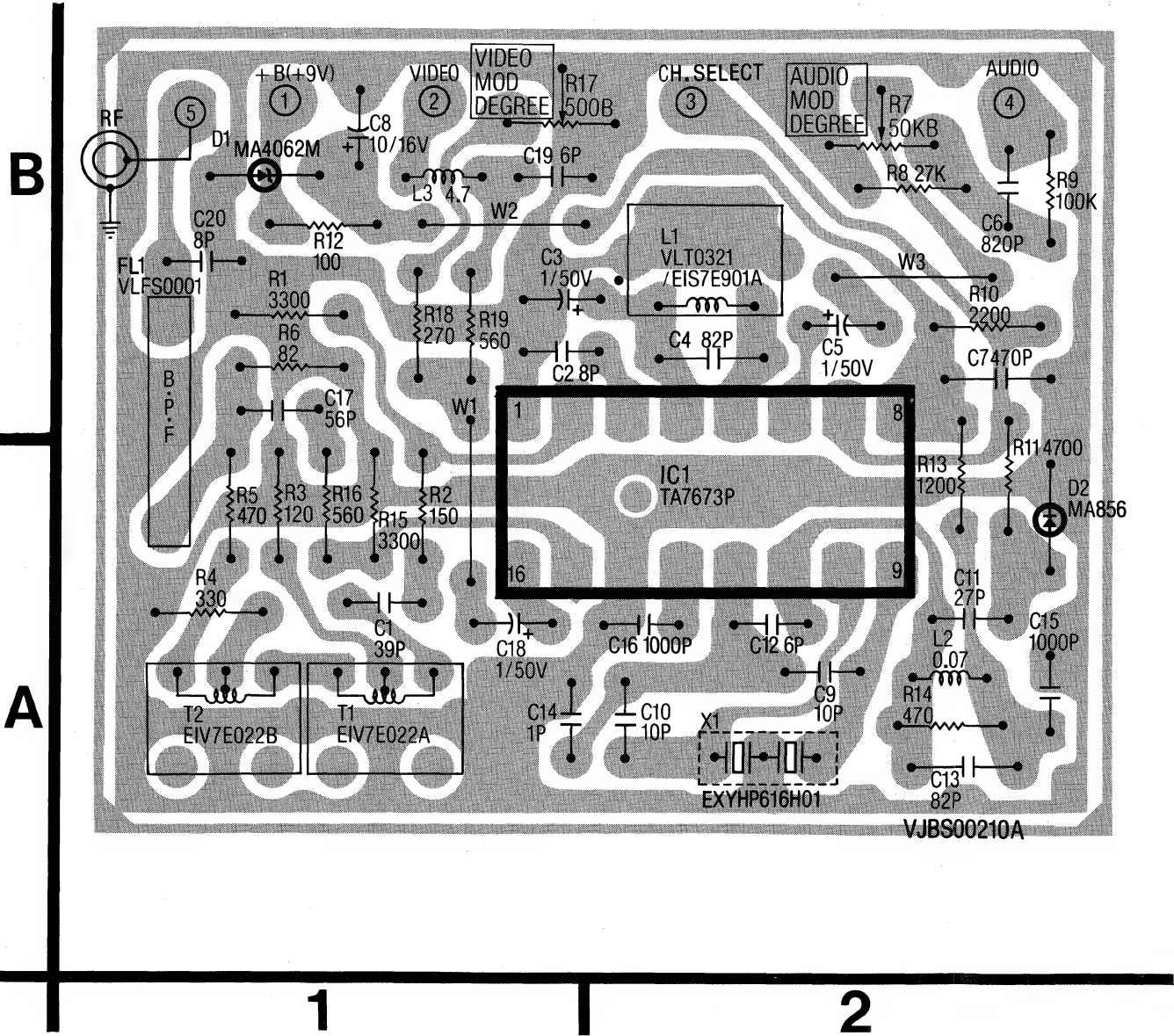
IMPORTANT NOTICE:  
IF UNIT PARTS ARE REPLACED INDIVIDUALLY, THE FCC  
SPECIFICATIONS WILL NOT BE SATISFIED.  
DURING SERVICING, PLEASE REPLACE AS A UNIT.



RF CONVERTER UNIT (VEQS0206)

4-9  
RF CONVERTER  
CIRCUIT

IMPORTANT NOTICE:  
IF UNIT PARTS ARE REPLACED INDIVIDUALLY, THE FCC  
SPECIFICATIONS WILL NOT BE SATISFIED.  
DURING SERVICING, PLEASE REPLACE AS A UNIT.



1) +B(+9V)

3) CH. SELECT

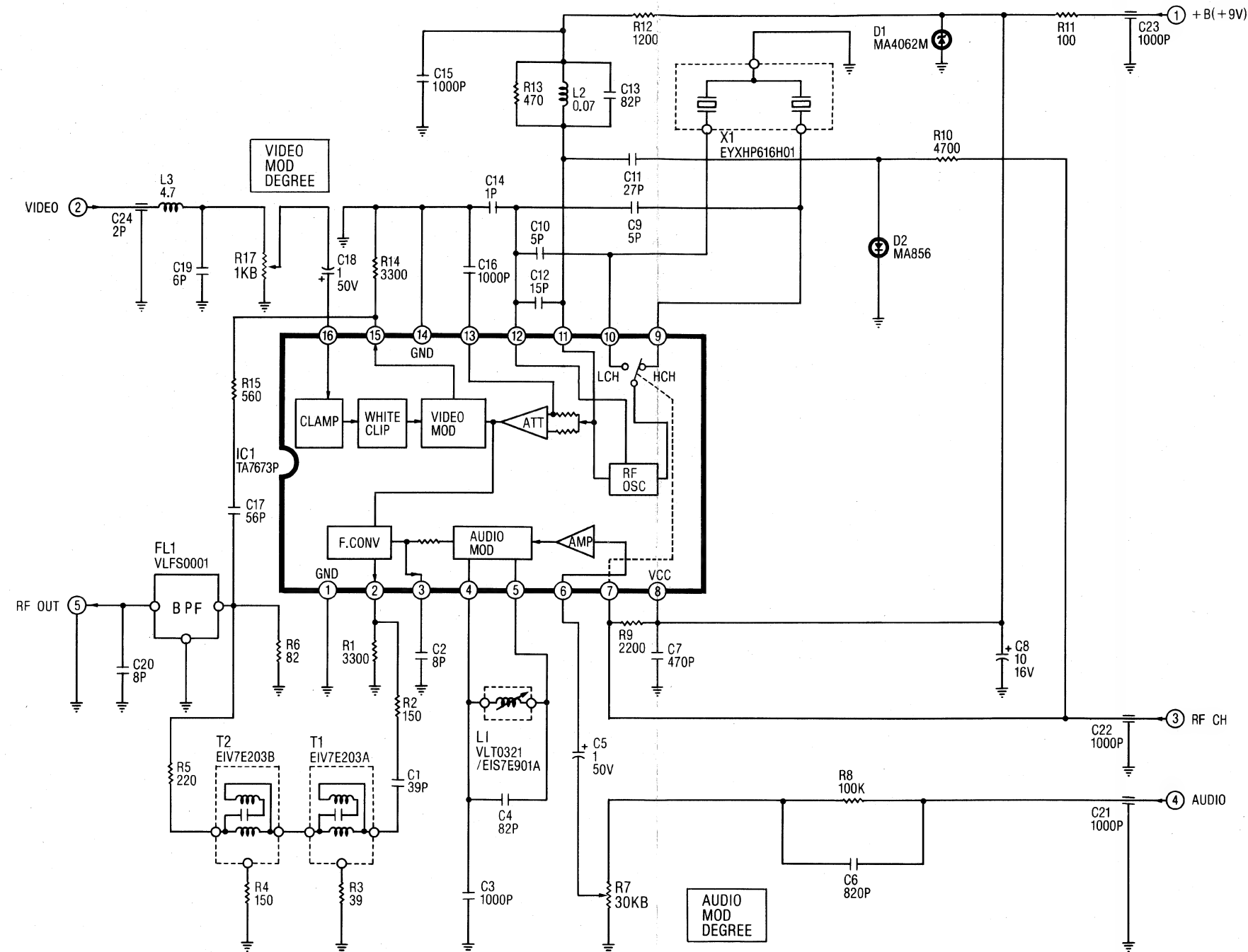
1) AUDIO

4-10  
RF CONVERTER  
CIRCUIT



# RF CONVERTER SCHEMATIC DIAGRAM (VEQS0236)

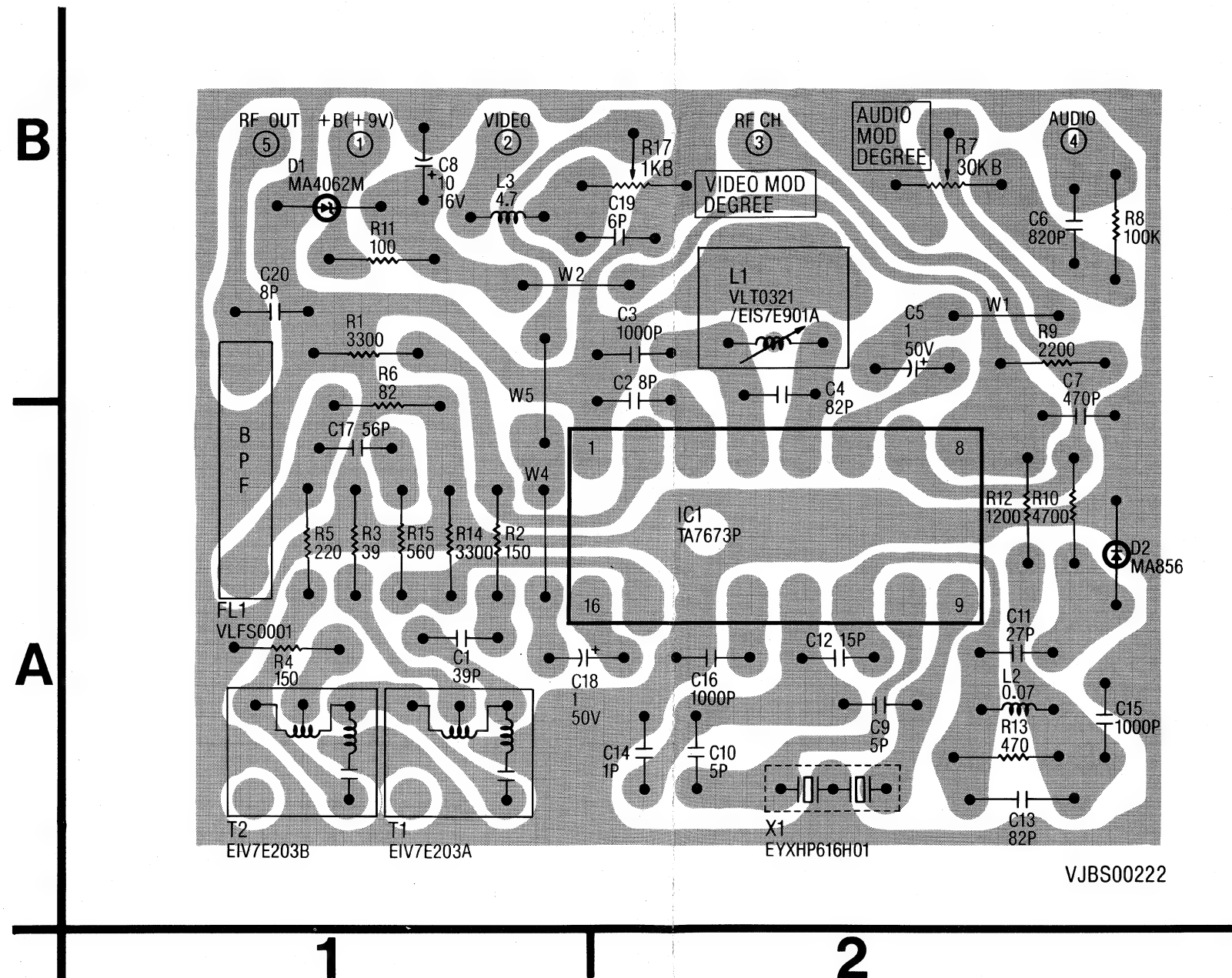
IMPORTANT NOTICE:  
IF UNIT PARTS ARE REPLACED INDIVIDUALLY, THE FCC  
SPECIFICATIONS WILL NOT BE SATISFIED.  
DURING SERVICING, PLEASE REPLACE AS A UNIT.



VJBS00222

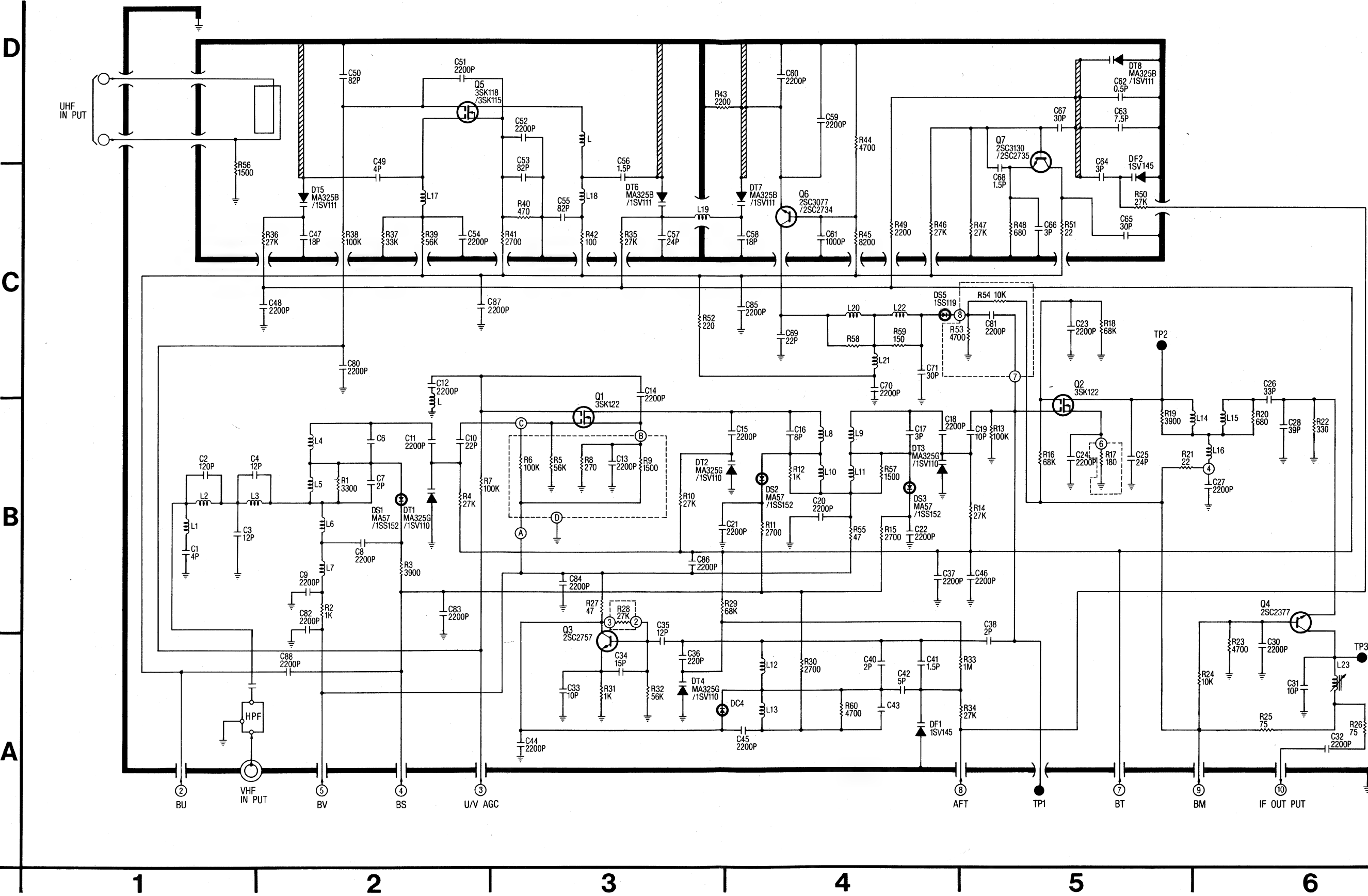
# RF CONVERTER UNIT (VEQS0236)

IMPORTANT NOTICE:  
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UHF/VHF TUNER SCHEMATIC DIAGRAM (TNV76355F2)

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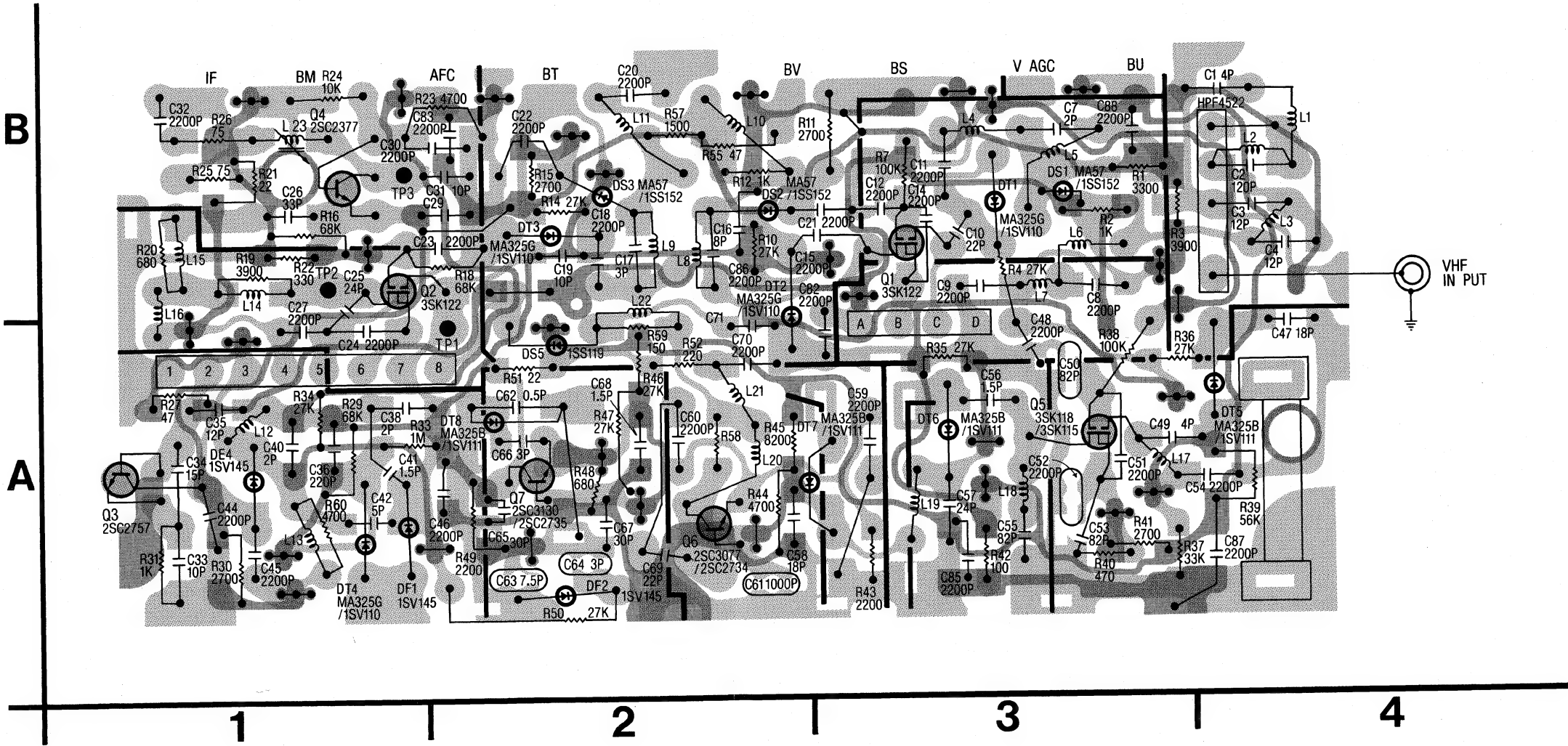
UHF/VHF TUNER SCHEMATIC DIAGRA	
Q1	3-B
Q2	5-B
Q3	3-A
Q4	6-B
Q5	2-D
Q6	4-C
Q7	5-C



UHF/VHF TUNER UNIT (TNV76355F2)

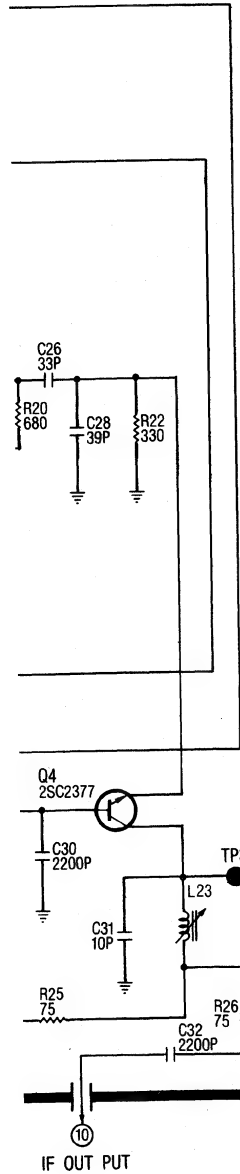
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UHF/VHF TUNER SCHEMATIC DIAGRAM	
Q1	3-B
Q2	5-B
Q3	3-A
Q4	6-B
Q5	2-D
Q6	4-C
Q7	5-C



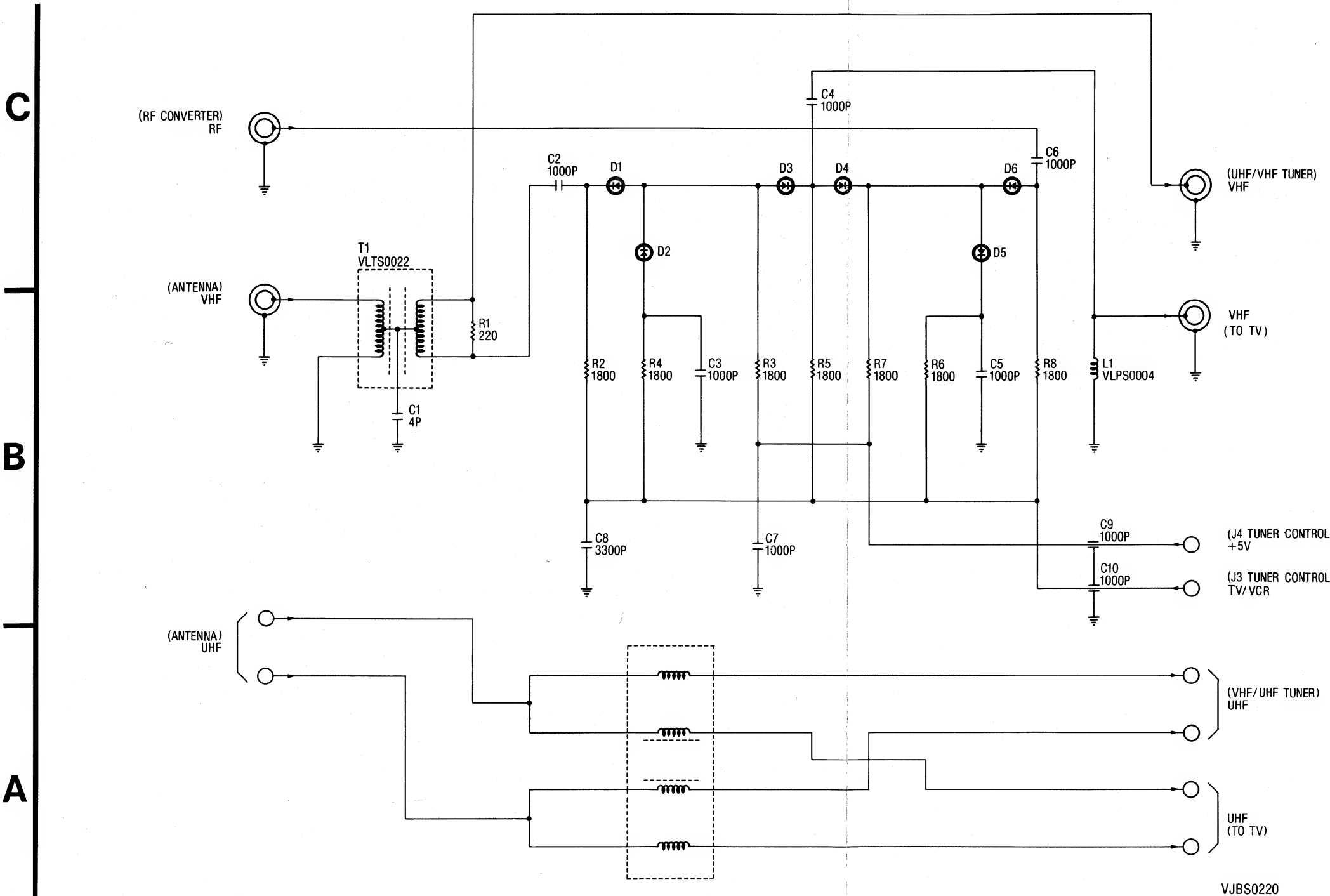
UHF/VHF TUNER UNIT	
Q1	3-B
Q2	1-B
Q3	1-A
Q4	1-B
Q5	3-A
Q6	2-A
Q7	2-A

THE FCC  
IT.



ANTENNA TERMINAL SCHEMATIC DIAGRAM

IMPORTANT NOTICE:  
IF UNIT PARTS ARE REPLACED INDIVIDUALLY, THE FCC  
SPECIFICATIONS WILL NOT BE SATISFIED.  
DURING SERVICING, PLEASE REPLACE AS A UNIT.

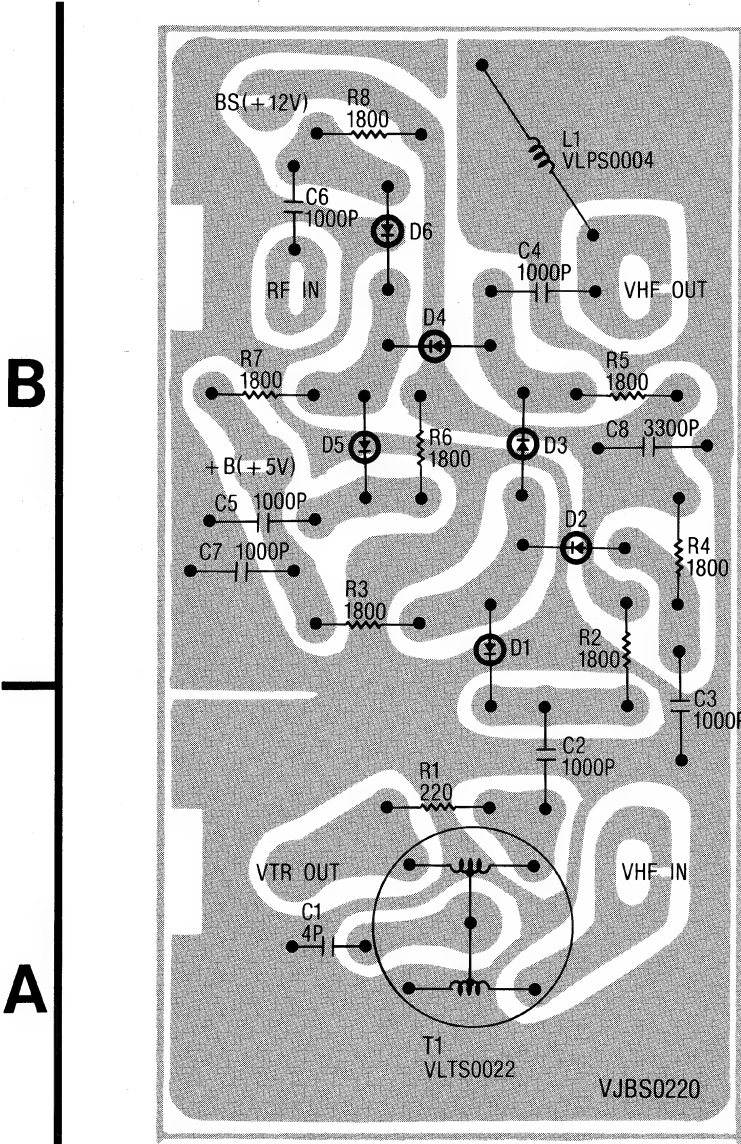


UNLESS OTHERWISE SPECIFIED;  
WATTAGE OF RESISTORS ARE 1/4W AND  
DIODES ARE MA858.

ANTENNA TERMINAL UNIT  
(VJJS0037)

SENSO

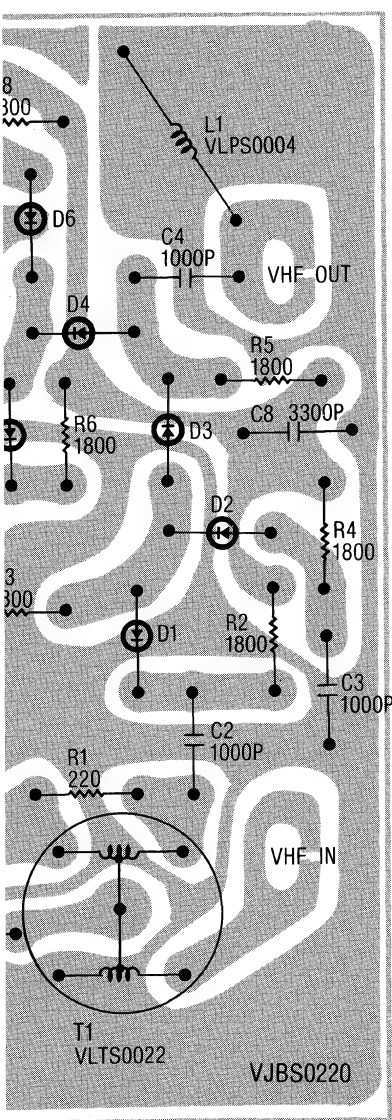
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SPECIFICATIONS WILL NOT BE SATISFIED.  
DURING SERVICING, PLEASE REPLACE AS A UNIT.



UNLESS OTHERWISE SPECIFIED;  
WATTAGE OF RESISTORS ARE 1/4W AND  
DIODES ARE MA858.

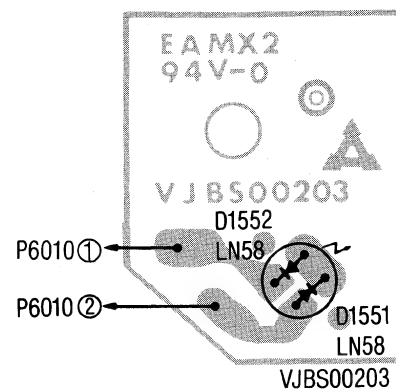
# INAL UNIT (VJJS0037)

REPLACED INDIVIDUALLY, THE FCC  
LL NOT BE SATISFIED.  
PLEASE REPLACE AS A UNIT.

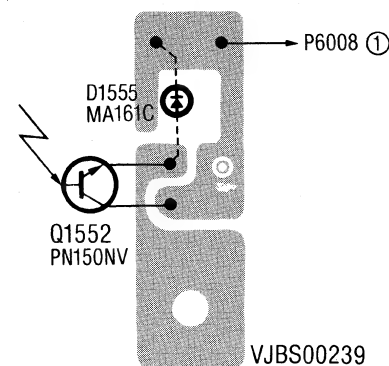


UNLESS OTHERWISE SPECIFIED;  
WATTAGE OF RESISTORS ARE 1/4W AND  
DIODES ARE MA858.

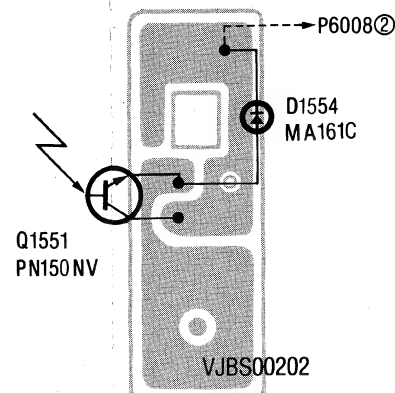
## SENSOR LED C.B.A. VEKS0968



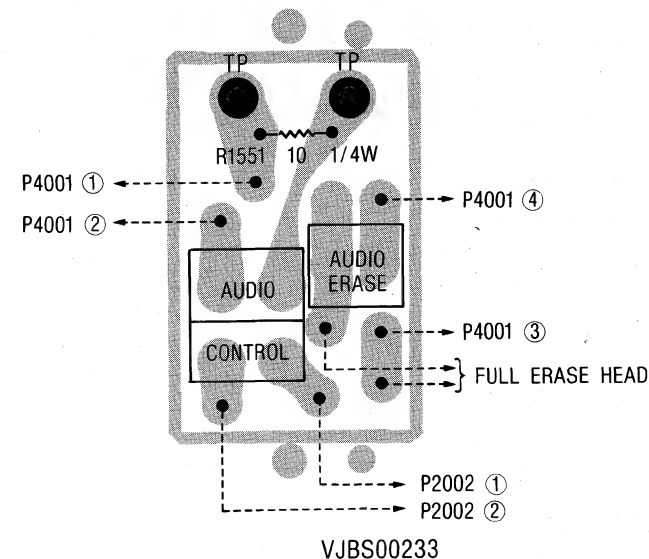
## SUPPLY PHOTO TR C.B.A.



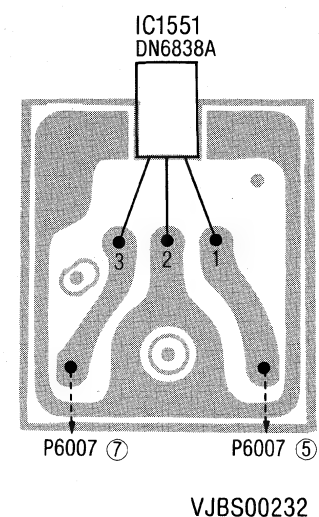
## TAKEUP PHOTO TR C.B.A.



## AUDIO/CONTROL HEAD C.B.A.

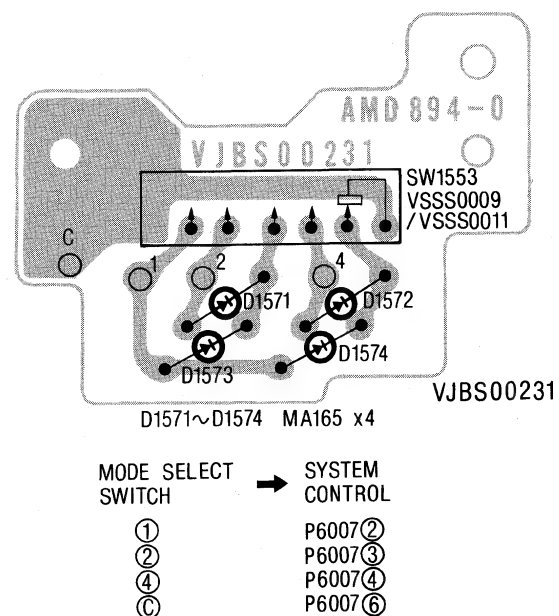


## REEL SENSOR C.B.A. VEKS1119

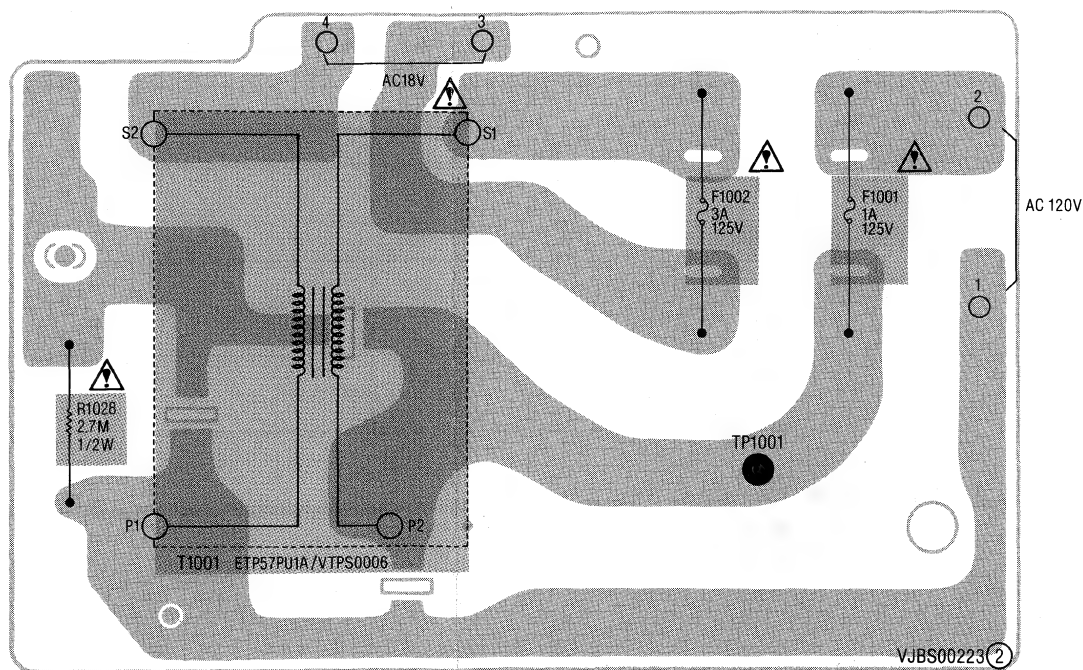


**IMPORTANT SAFETY NOTICE:**  
COMPONENTS IDENTIFIED BY THE SIGN HAVE SPECIAL  
CHARACTERISTICS IMPORTANT FOR SAFETY.  
WHEN REPLACING ANY OF THESE COMPONENTS USE ONLY THE  
ORIGINALLY SPECIFIED PARTS.

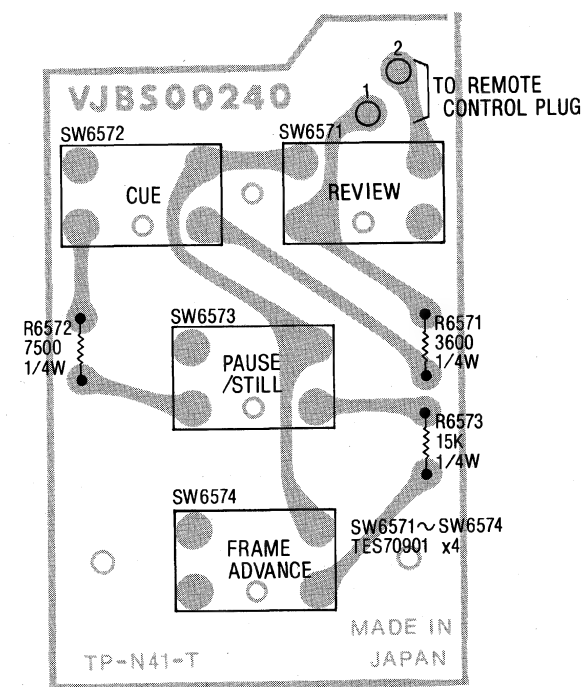
## MODE SELECT SWITCH C.B.A. VEKS1121



## FUSE C.B.A. VEKS1129



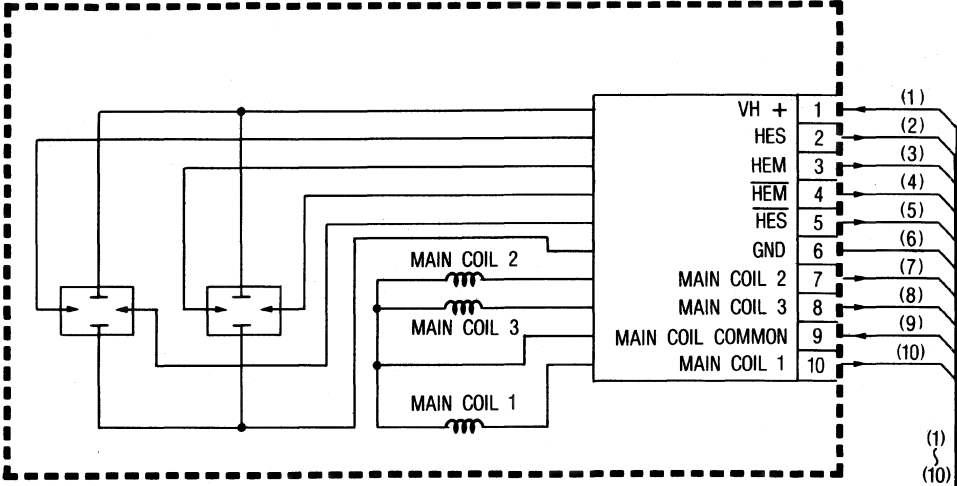
## WIRED TRANSMITTER UNIT



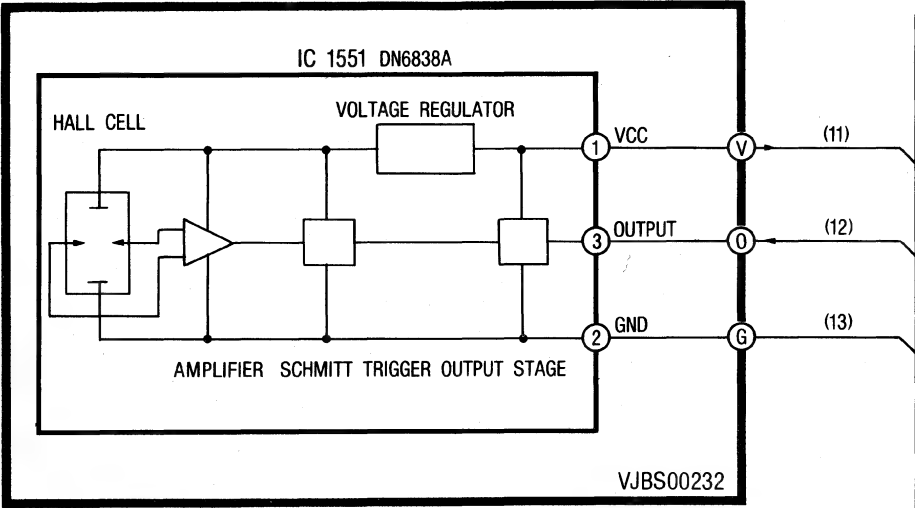
VJBS00240

INTERCONNECTION SCHEMATIC DIAGRAM

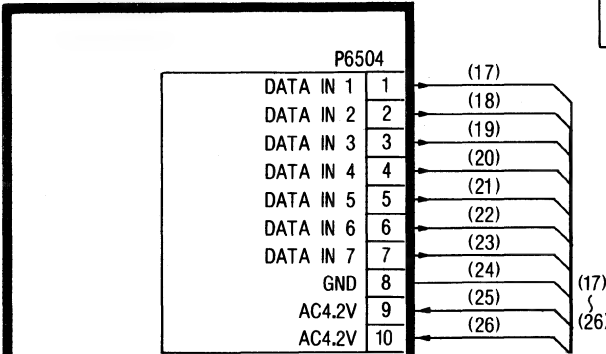
CYLINDER MOTOR



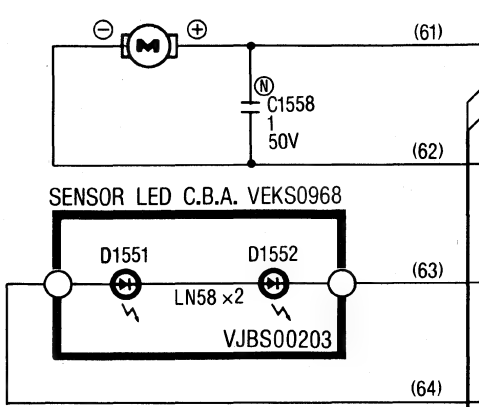
REEL SENSOR C.B.A. VEKS1119



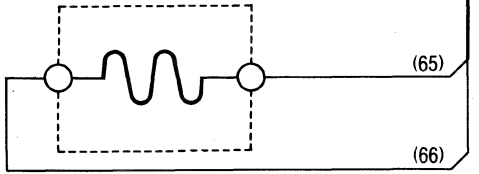
OPERATION C.B.A. VEPS0677A



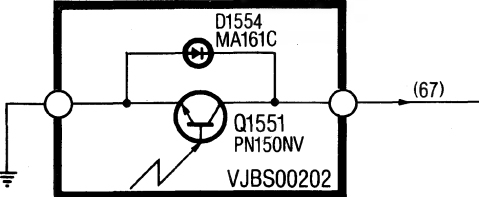
LOADING MOTOR C.B.A.



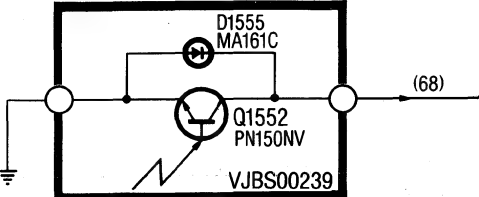
DEW SENSOR



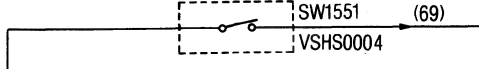
TAKEUP PHOTO TR C.B.A.



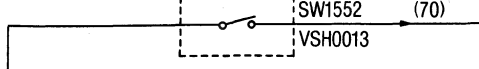
SUPPLY PHOTO TR C.B.A.



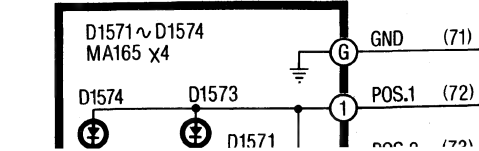
CASSETTE DOWN SWITCH



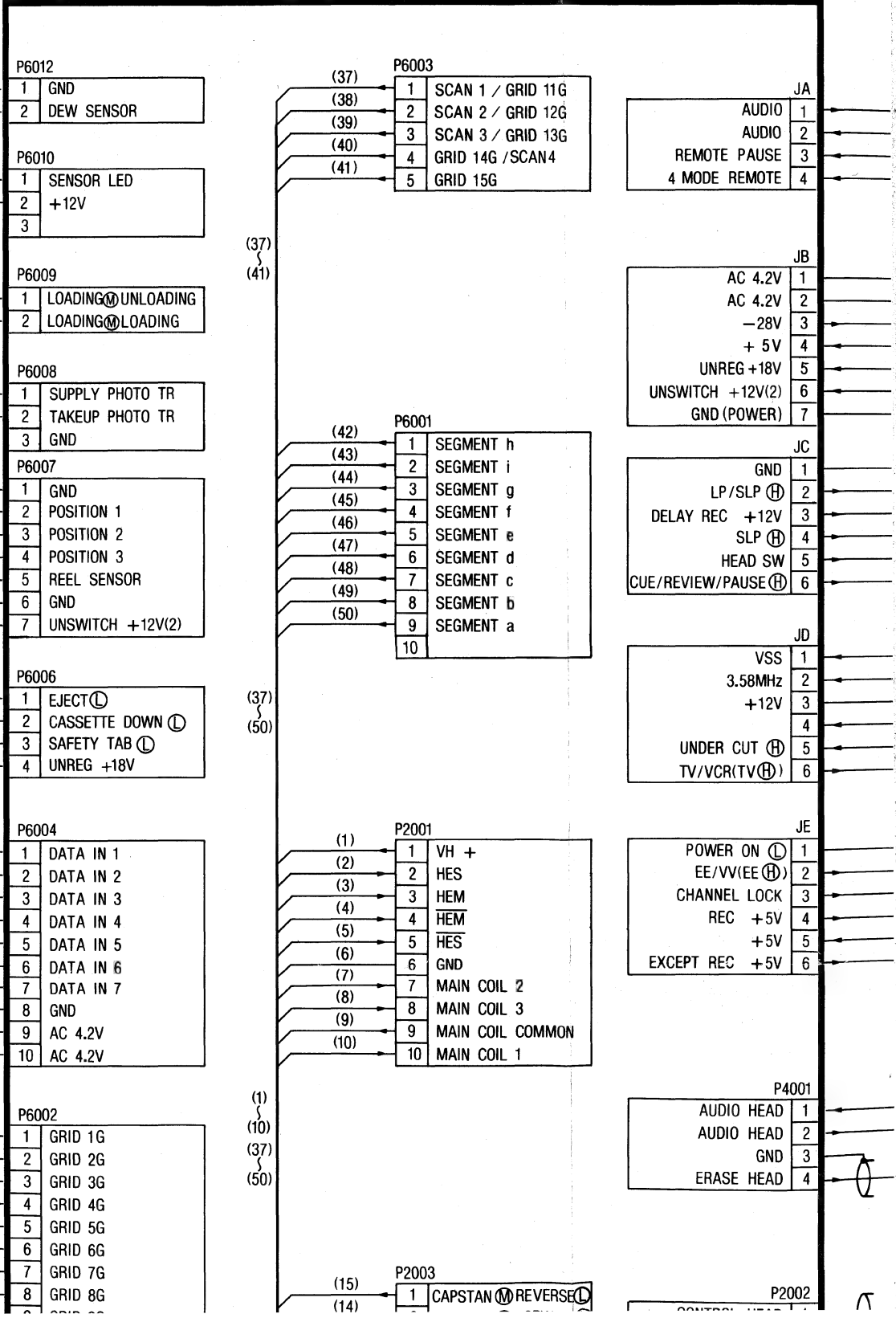
SAFETY TAB SWITCH




MODE SELECT SWITCH C.B.A. VEKS1121



SERVO, AUDIO & SYSTEM CONTROL C.B.A. VEPS0232A1

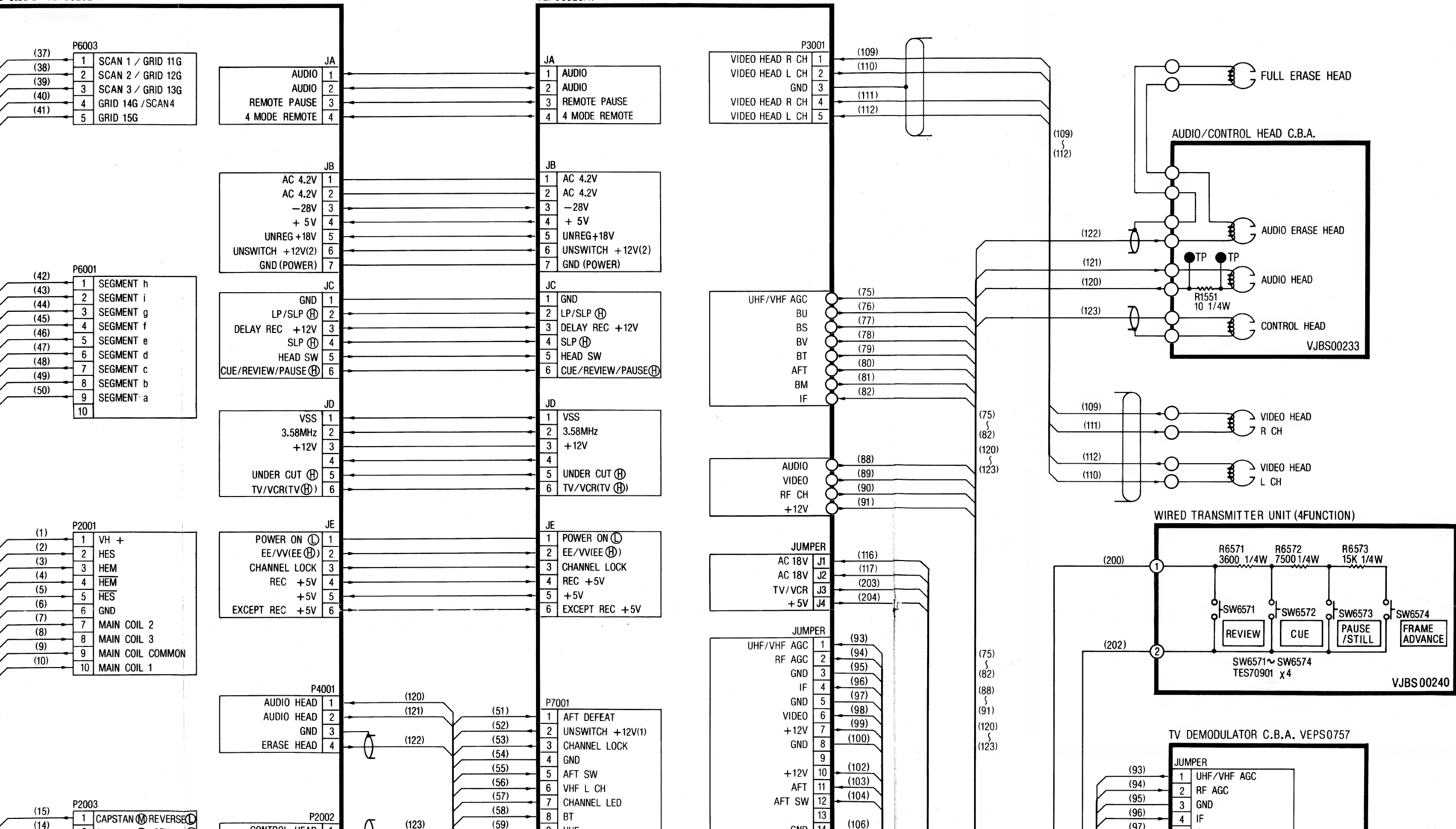




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C.B.A. VEPS0232A1

LUMINANCE, CHROMINANCE, POWER SUPPLY & TUNER CONTROL C.B.A.  
VEPS0326A1

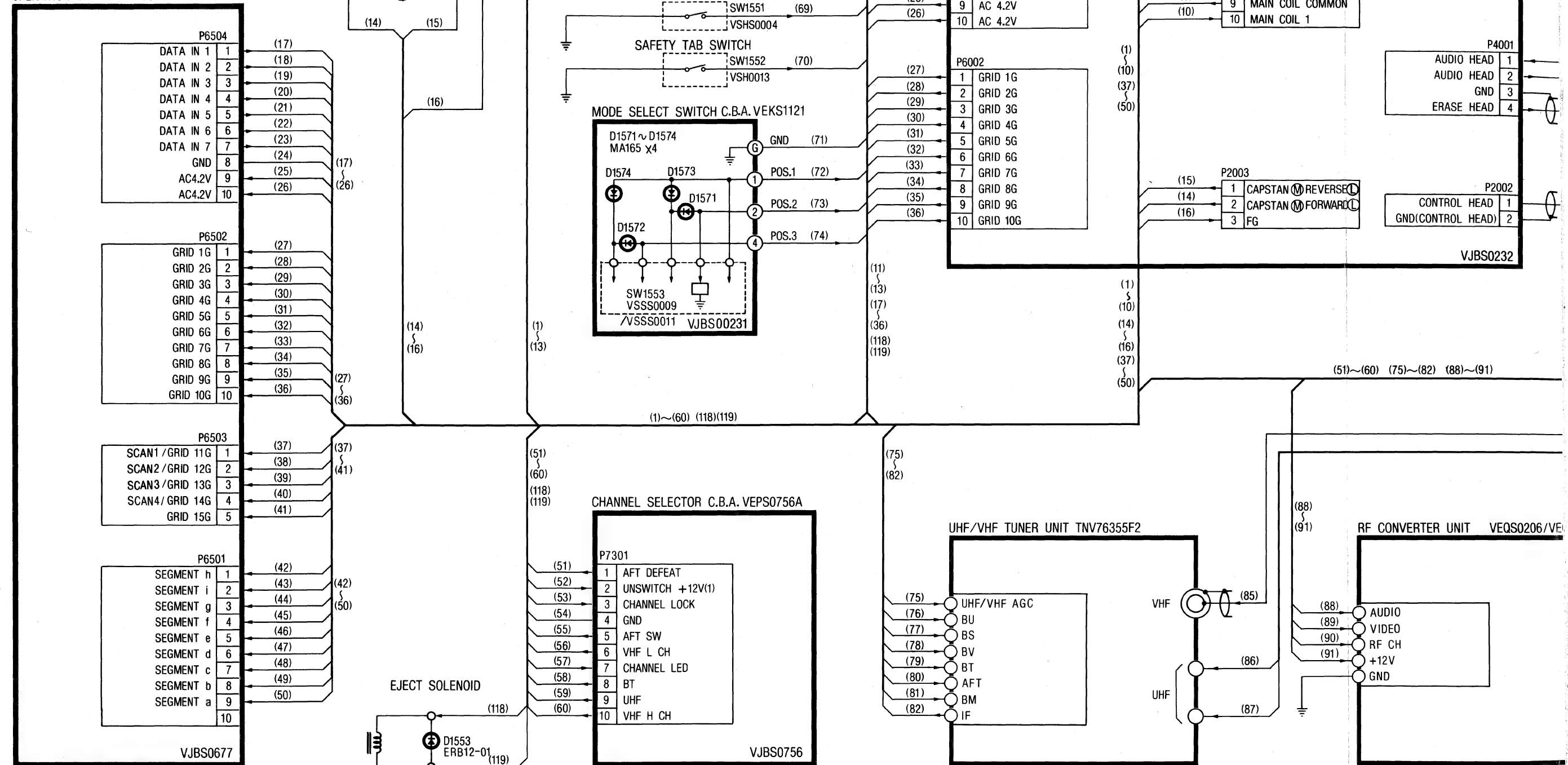


C

B

A

## OPERATION C.B.A. VEPS0677A







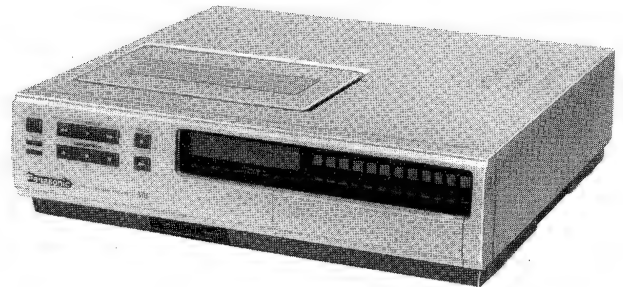
# Service Manual

**Vol. 5**

Video Cassette Recorder

**Panasonic**  
 Omnivision **VHS**
**PV-1220**

## Exploded Views Replacement Parts List



### SPECIFICATIONS

**Power Source:** 120 V AC  $\pm 10\%$ , 60 Hz  $\pm 0.5\%$   
**Power Consumption:** Approx. 21 watts  
**Television System:** EIA Standard (525 lines, 60 fields)  
 NTSC color signal  
**Video Recording**  
     **System:** 2 rotary heads, helical scanning system  
     **Luminance:** FM azimuth recording  
     **Color signal:** Converted subcarrier phase shift recording  
**Audio Track:** 1 track  
**Tape Format:** Tape width 1/2" (12.7 mm), high density tape  
**Tape Speed:** SP mode: 1-5/16 i.p.s. (33.35 mm/s)  
     LP mode: 21/32 i.p.s. (16.67 mm/s)  
     SLP mode: 7/16 i.p.s. (11.12 mm/s)  
**Record/Playback Time:** 8 HRS. with 160 min. type tape used in SLP mode  
**FF/REW Time:** Less than 6 min. with 120 min. type tape  
**Heads:** Video: 2 rotary heads  
     Audio/Control: 1 stationary head  
     Erase: 1 full track erase  
     1 audio track erase  
**Input Level:** Video: VIDEO IN Jack (RCA type)  
     1.0 Vp-p, 75  $\Omega$  unbalanced  
     Audio: AUDIO IN Jack (RCA type)  
     -20 dB, 100 k $\Omega$  unbalanced  
**TV Tuners:** VHF Input: VHF Ch2-Ch13,  
     75  $\Omega$  unbalanced  
     UHF Input: Ch14-Ch83,  
     300  $\Omega$  balanced  
**Output Level:** Video: VIDEO OUT Jack (RCA type)  
     1.0 Vp-p, 75  $\Omega$  unbalanced  
     Audio: AUDIO OUT Jack (RCA type)  
     -6 dB, 600  $\Omega$  unbalanced  
**RF Modulated:** Ch3/Ch4 switchable,  
     72 dB $\mu$ , (Open Voltage)  
     75  $\Omega$  unbalanced

### Video Horizontal

**Resolution:** Color: more than 230 lines  
 B/W: more than 230 lines

### Audio Frequency

**Response:** SP mode: 100 Hz ~ 8 kHz  
 (10 dB down) LP mode: 100 Hz ~ 6 kHz  
 SLP mode: 150 Hz ~ 5 kHz

**Signal-to-Noise Ratio:** Video: SP mode: better than 40 dB  
 LP mode: better than 40 dB  
 SLP mode: better than 40 dB  
 (Rohde & Schwarz noise meter)  
 Audio: SP mode: better than 42 dB  
 LP mode: better than 40 dB  
 SLP mode: better than 40 dB

### Operation

**Temperature:** 41°F—104°F (5°C—40°C)  
**Operating Humidity:** 10%—75%  
**Weight:** 17.6 lbs. (8.0 kg)  
**Dimensions:** 16-15/16" (W)  $\times$  14-3/8" (D)  $\times$  4-1/2" (H)  
 (430 mm  $\times$  365 mm  $\times$  115 mm)

**Accessories Supplied:**

- Remote control unit
- VHF matching box 75  $\Omega$ —300  $\Omega$  transformer
- 300  $\Omega$ —75  $\Omega$  transformer
- Coaxial cable with one-touch type F Connector
- Twin-lead cable

**Available Tapes:** 1/2" VHS video cassette tapes  
 NV-T160 Approx. 1073 ft. (327 m), 160, 320, or 480 min  
 NV-T120 Approx. 810 ft. (247 m), 120, 240, or 360 min  
 NV-T60 Approx. 417 ft. (127 m), 60, 120, or 180 min.

Weight and dimensions shown are approximate. Specifications are subject to change without notice.

**Panasonic®**

Matsushita Engineering & Service Company  
 Division of Matsushita Electric  
 Corporation of America  
 50 Meadowland Parkway, Secaucus,  
 New Jersey 07094

Panasonic Hawaii Inc.  
 91-238 Kauhū St. Ewa Beach  
 P.O. Box 774  
 Honolulu, Hawaii 96808-0774

Matsushita Electric  
 of Canada Limited  
 5770 Ambler Drive, Mississauga,  
 Ontario, L4W 2T3

Panasonic Sales Company,  
 Division of Matsushita Electric  
 of Puerto Rico, Inc.  
 Ave. 65 De Infanteria, KM 9.7  
 Victoria Industrial Park  
 Carolina, Puerto Rico 00630

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## IMPORTANT SAFETY NOTICE

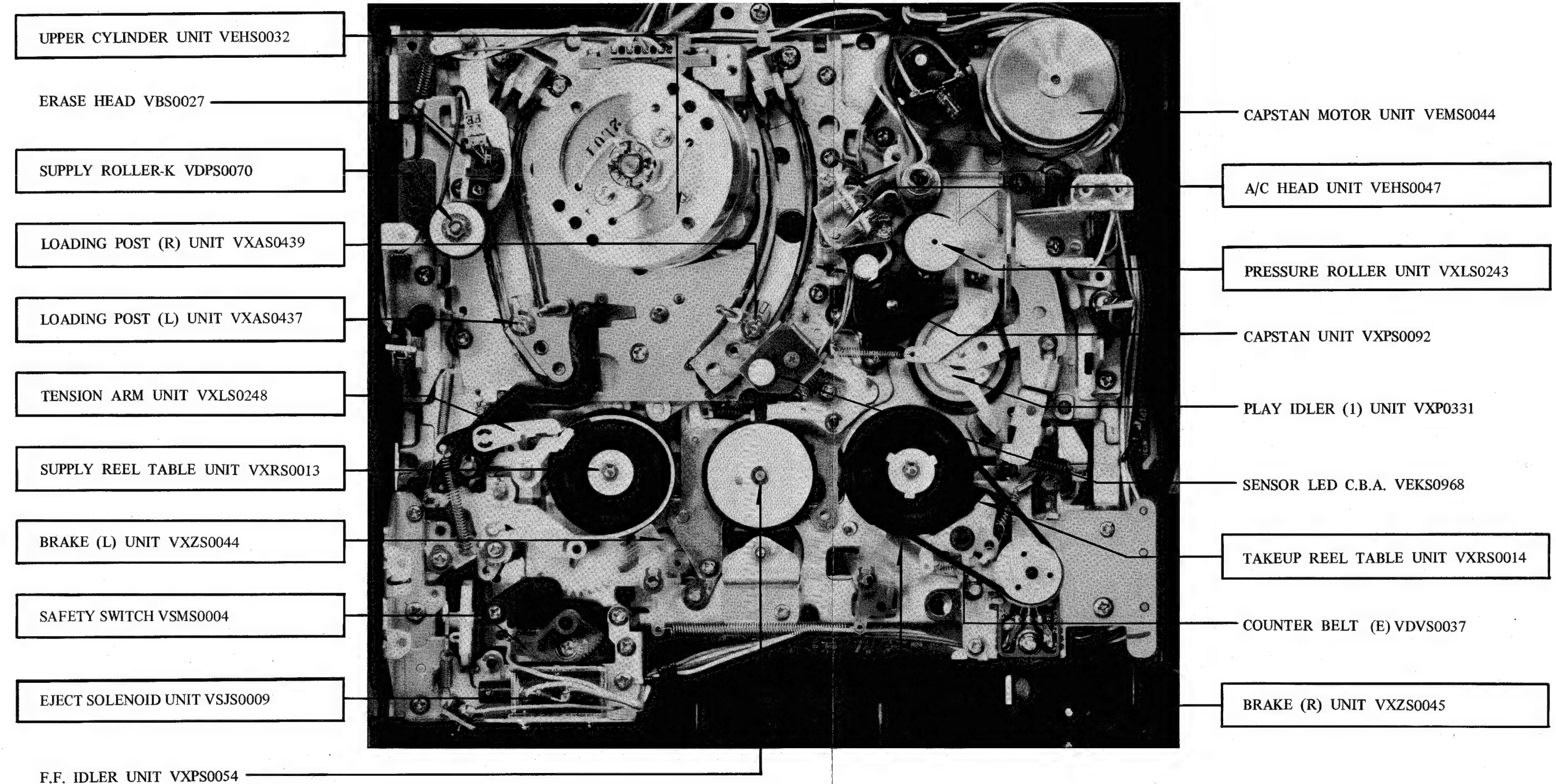
There are special components used in this equipment which are important for safety. These parts are shaded on the schematic diagram and on the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire, or other hazards. Do not modify the original design without permission of manufacturer.

# INNER PARTS LOCATION

## TOP VIEW

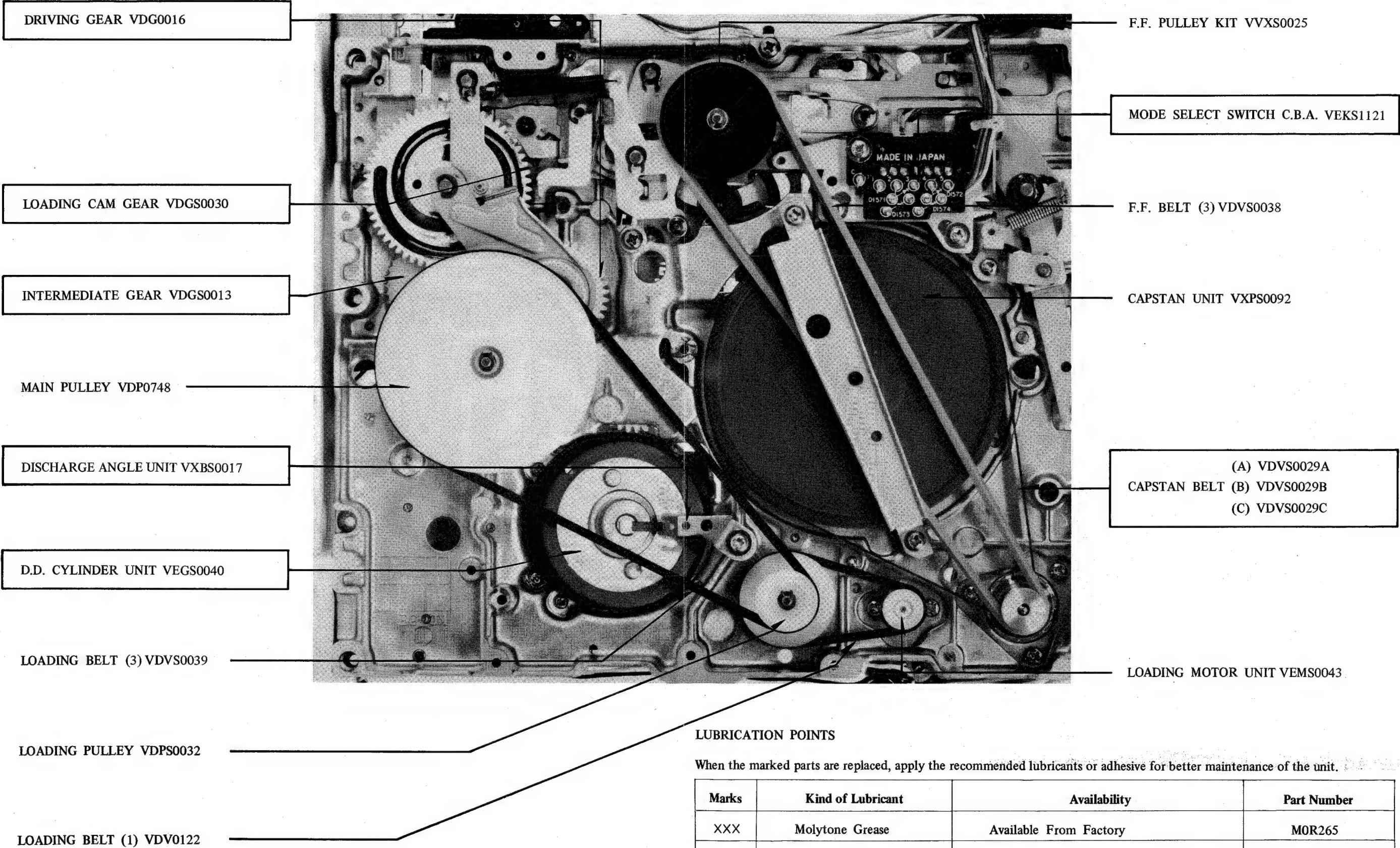
### Note:

When the mechanical parts surrounded with rectangle were removed or replaced, be sure to perform necessary adjustment or confirmation procedures according to the mechanical adjustment procedures section.





**BOTTOM VIEW**

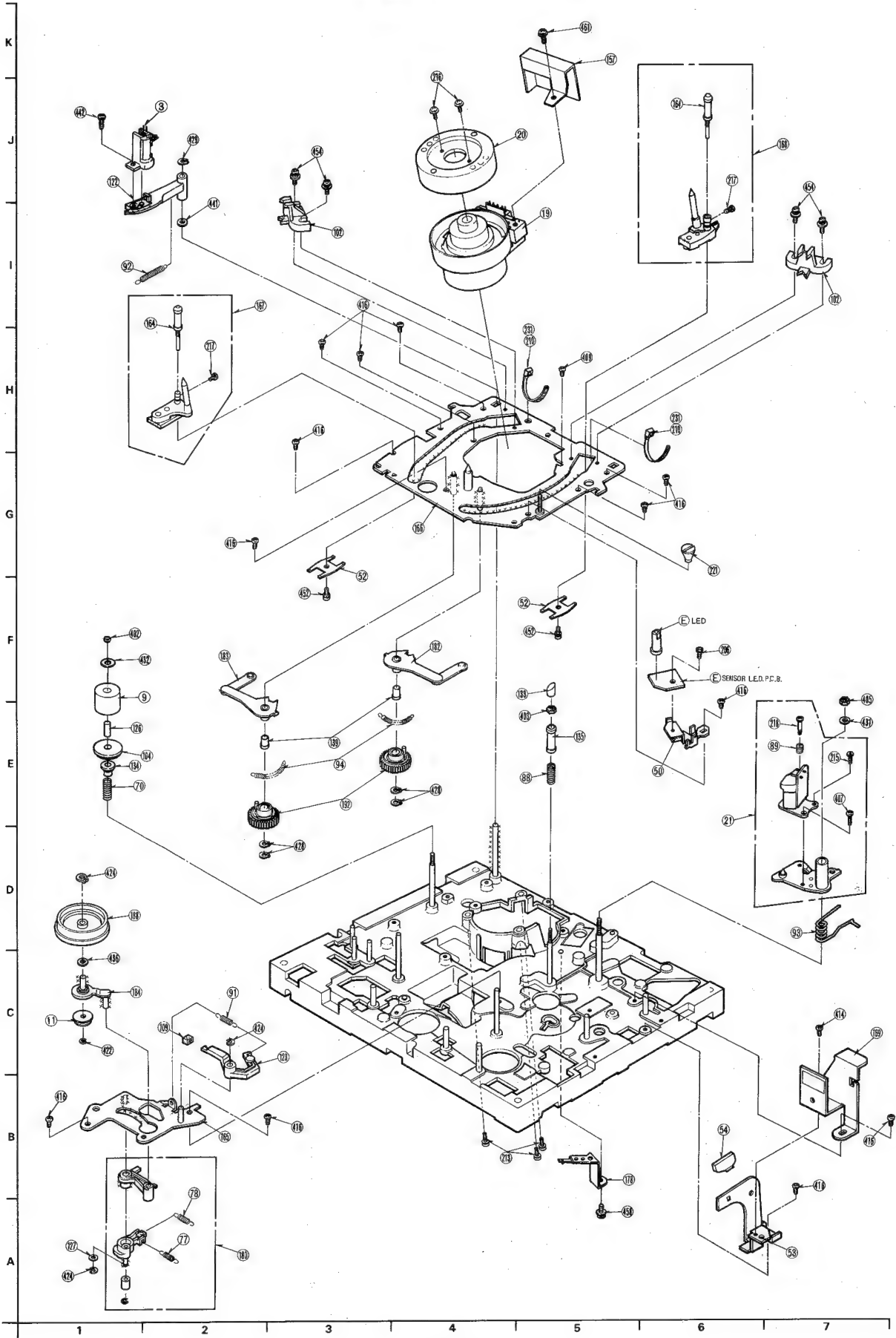


**LUBRICATION POINTS**

When the marked parts are replaced, apply the recommended lubricants or adhesive for better maintenance of the unit.

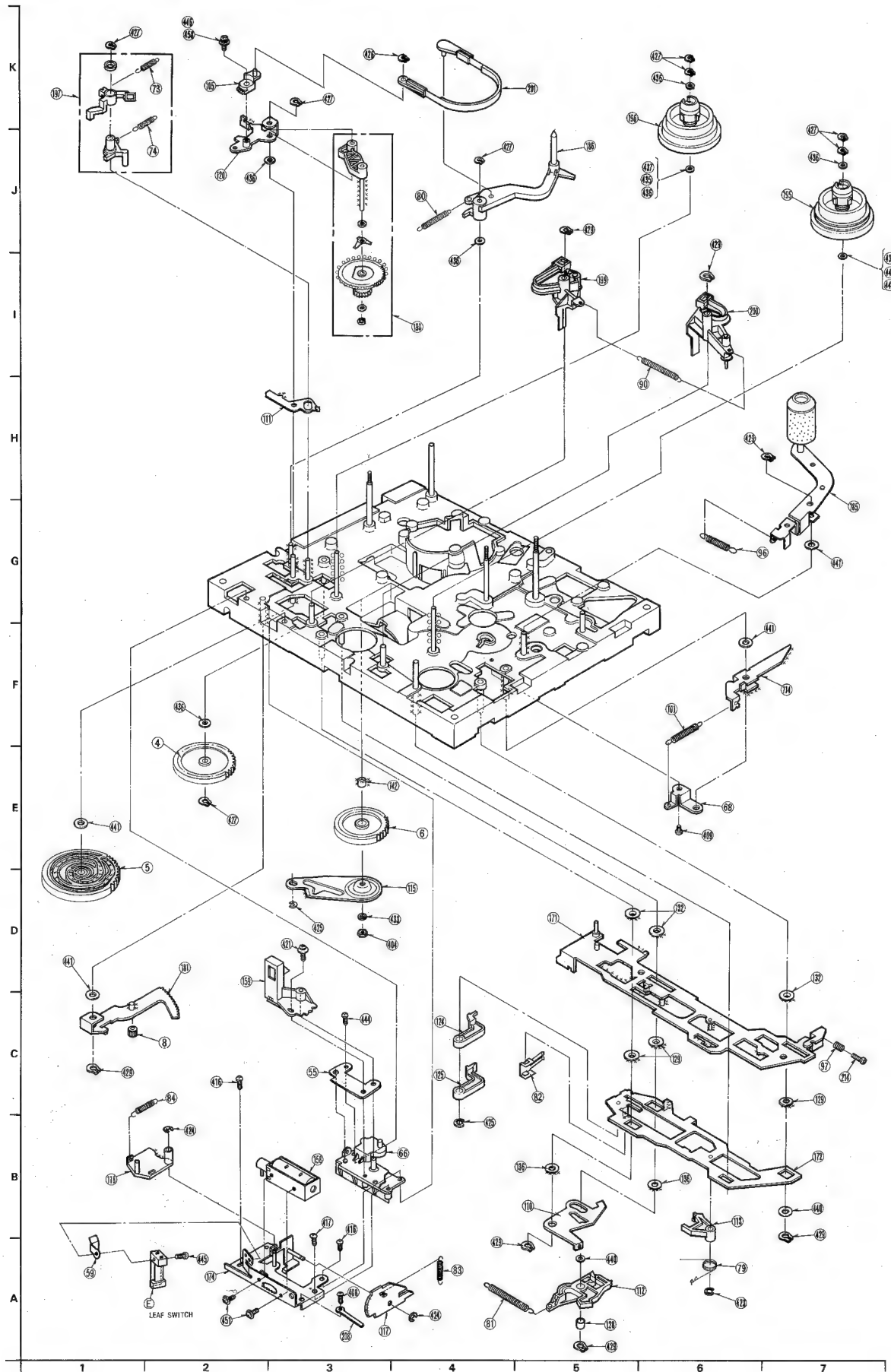
Marks	Kind of Lubricant	Availability	Part Number
XXX	Molytone Grease	Available From Factory	M0R265
OOO	Spindle Oil	Purchase From Local Supplier	. . . . .
ΔΔΔ	Gummed Adhesive	Purchase From Local Supplier	. . . . .

# EXPLODED VIEWS **1** Transport Section

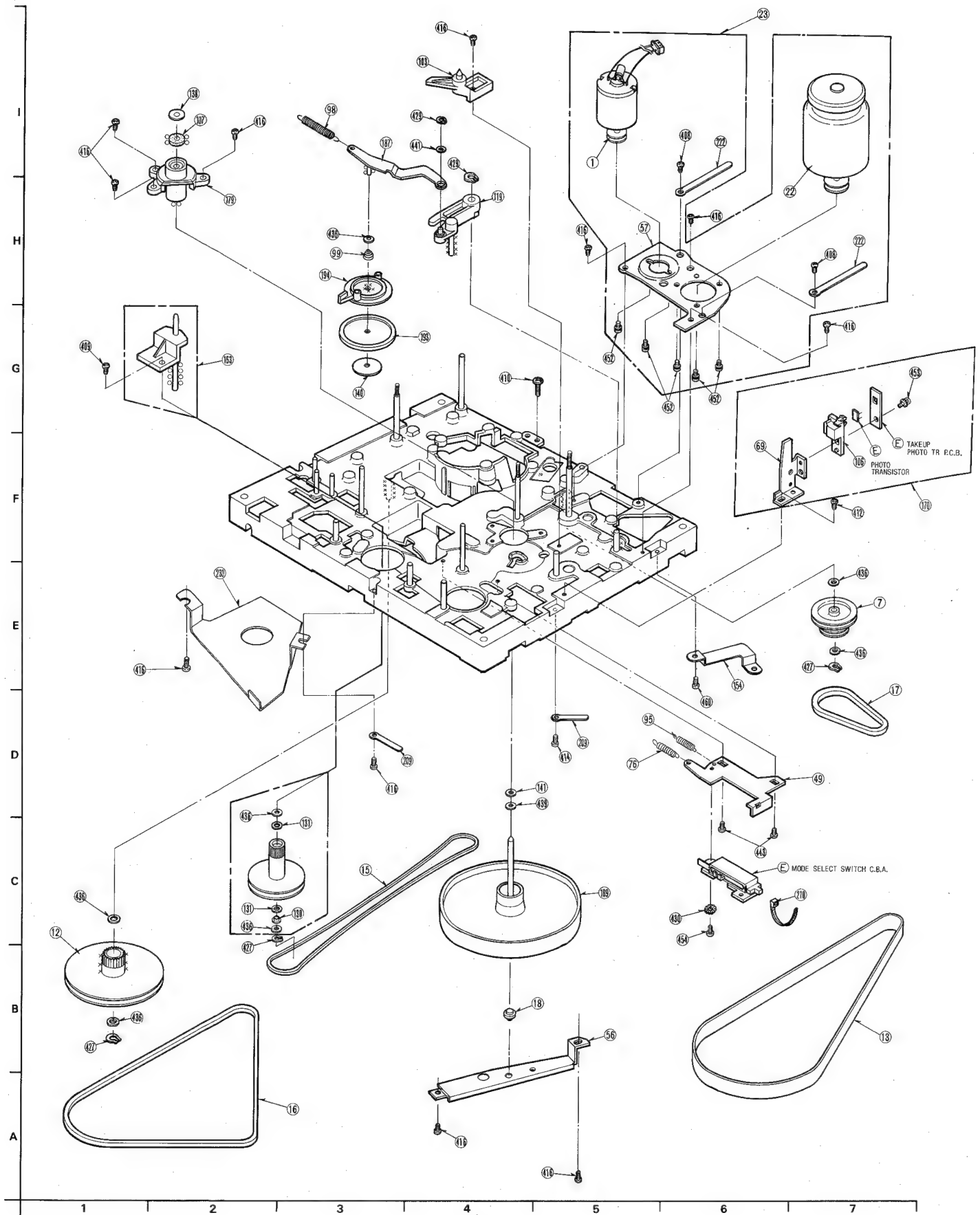




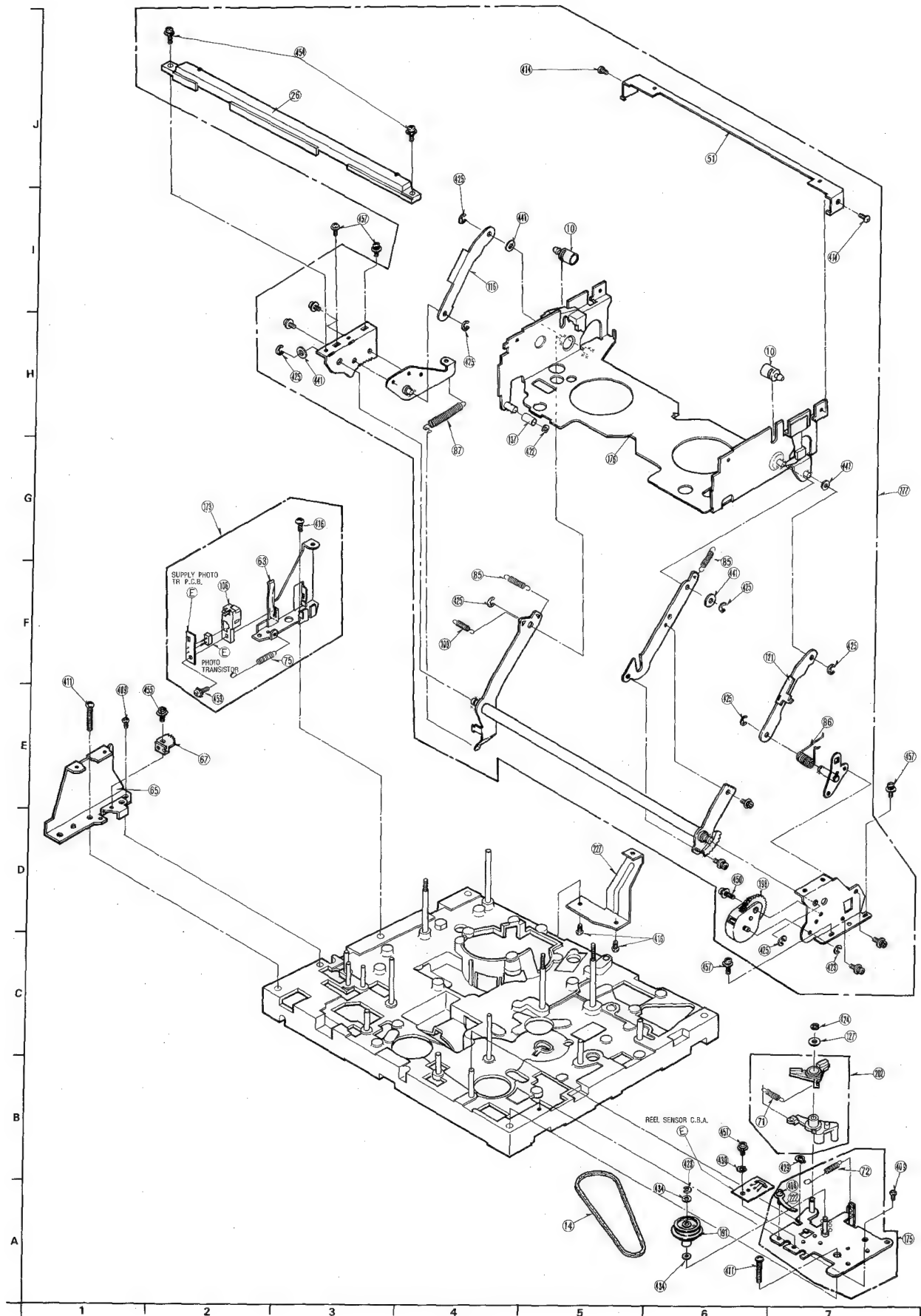
## 2 Moving Mechanism Section-(1)



### 3 Moving Mechanism Section-(2)

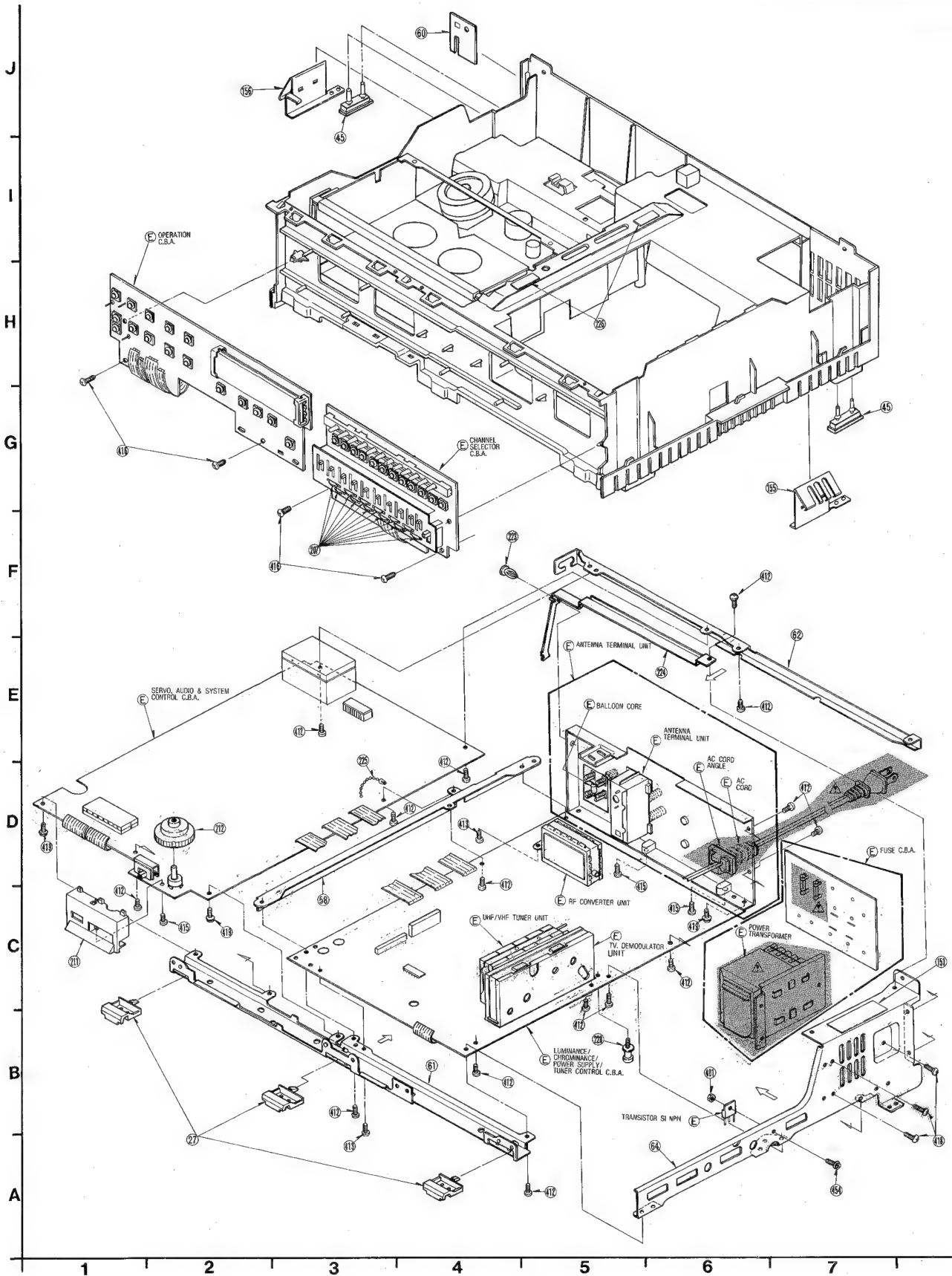


## 4 Cassette Up Mechanism Section

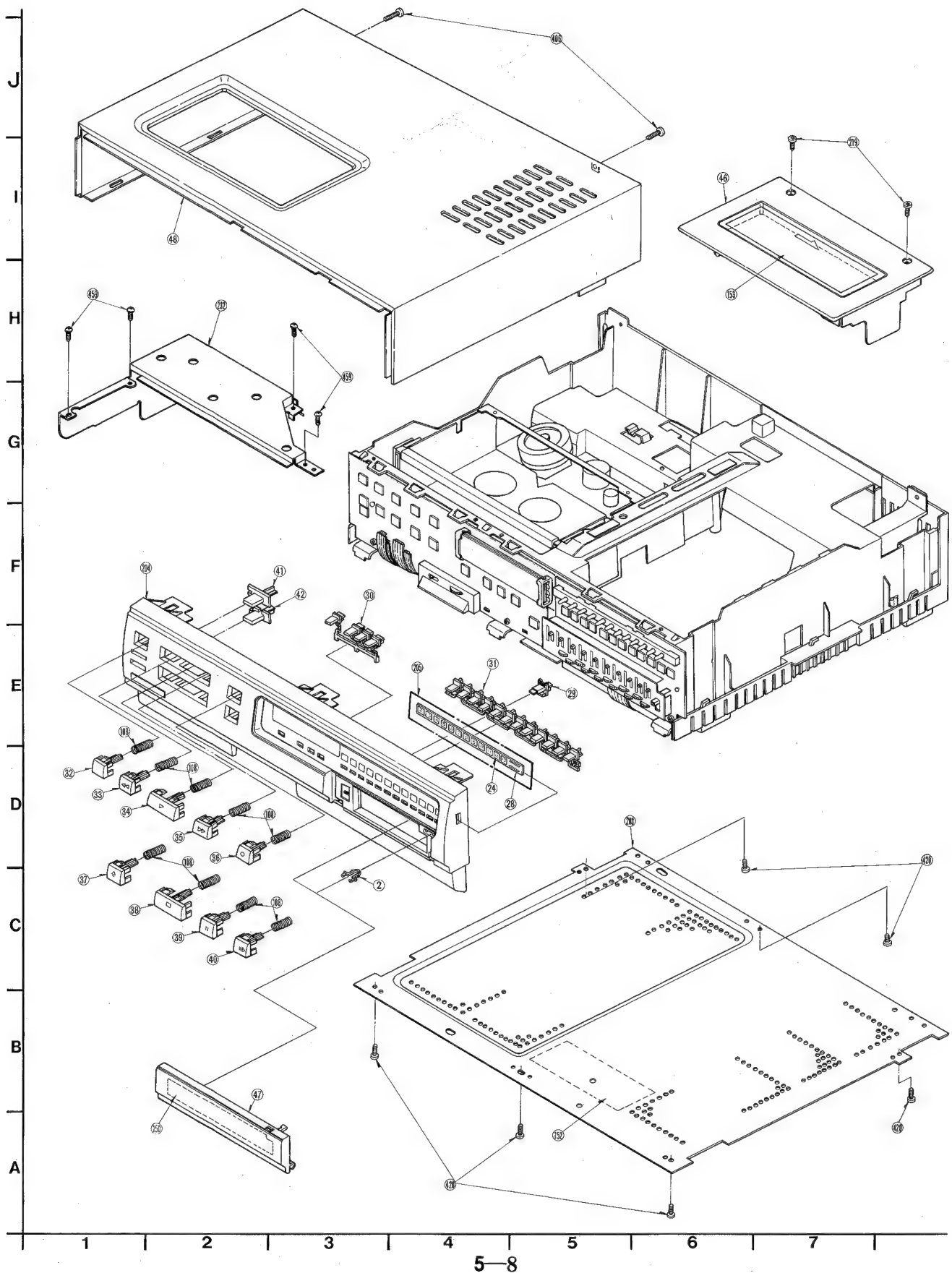


## 5 Chassis Frame & Tuner Parts Section

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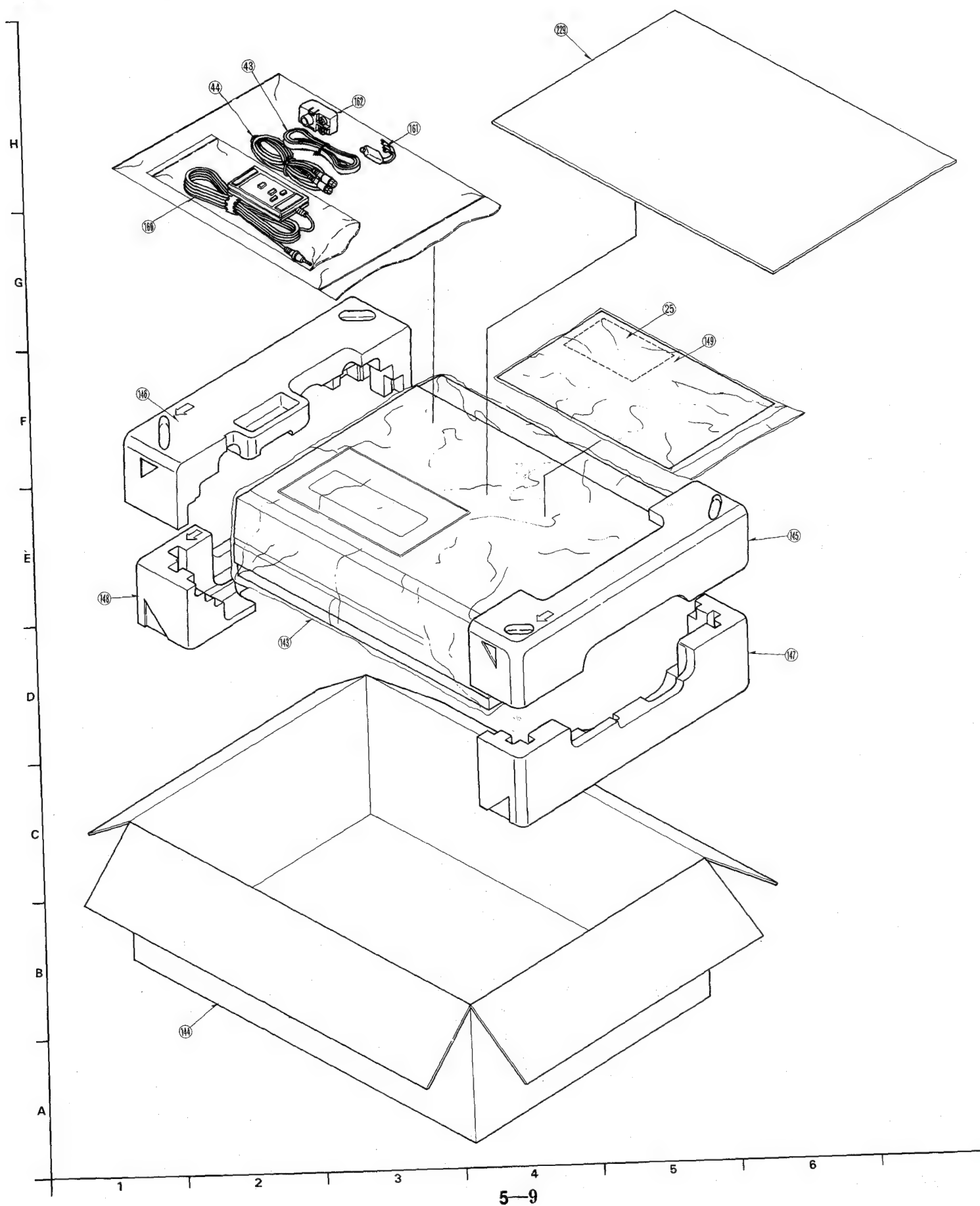


## 6 Casing Parts Section

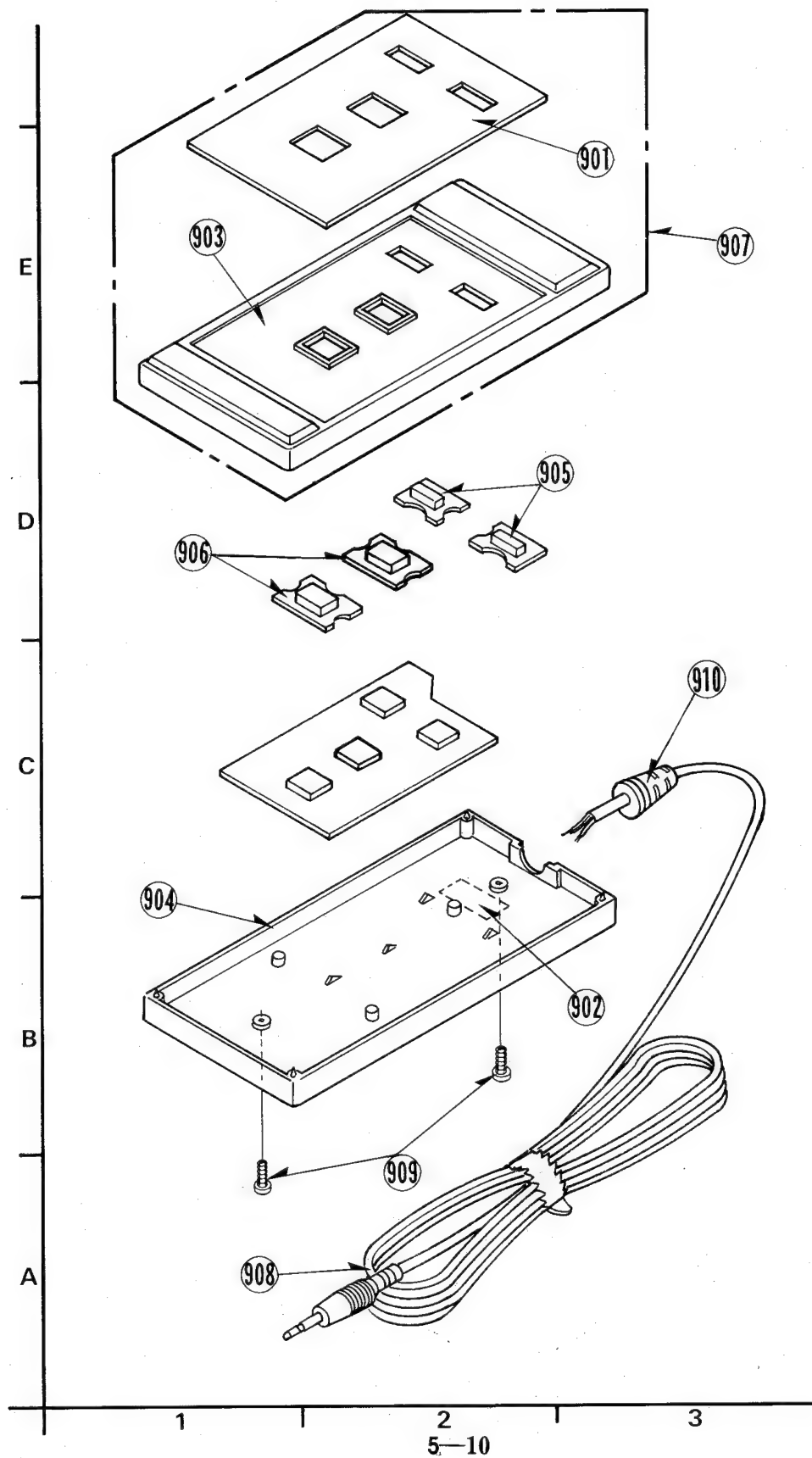




## 7 Packing Parts & Accessories Section



## 8 Wired Remote Control Unit Section



## MECHANICAL REPLACEMENT PARTS LIST

Model No. PV-1220

Note: Be sure to make your orders of replacement parts according to this list.  
Since all parts are available, availability column indicates no mark.

Item No.	Drawing No.	Description	Pcs/ Set	Availability	Part No.	Remark
1	3	LOADING MOTOR UNIT	1		VEMS0043	
2	6	DOOR CLAMPER	1		TKK769906	
3	1	ERASE HEAD	1		VBS0027	
4	2	INTERMEDIATE GEAR	1		VDGS0013	
5	2	LOADING CAM GEAR	1		VDGS0030	
6	2	DRIVING GEAR	1		VDG0016	
7	3	LOADING PULLEY	1		VDPS0032	
8	2	CAM FOLLOWER ROLLER	1		VDPS0034	
9	1	SUPPLY ROLLER -K	1		VDPS0070	
10	4	CASSETTE HOLDER ROLLER	2		VDPS0076	
11	1	GUIDE ROLLER	1		VDP0746	
12	3	MAIN PULLEY	1		VDP0748	
13	3	CAPSTAN BELT -A	1		VDVS0029A	
13	3	CAPSTAN BELT -B	1		VDVS0029B	
13	3	CAPSTAN BELT -C	1		VDVS0029C	
14	4	COUNTER BELT -E	1		VDVS0037	
15	3	F.F BELT -3	1		VDVS0038	
16	3	LOADING BELT -3	1		VDVS0039	
17	3	LOADING BELT -1	1		VDV0122	
18	3	THRUST SUPPORT	1		VDBS0049	
19	1	D.D CYLINDER UNIT	1		VEGS0040	
20	1	UPPER CYLINDER UNIT	1		VEHS0032	
21	1	A/C HEAD UNIT	1		VEHS0047	
22	3	CAPSTAN MOTOR UNIT	1		VEMS0044	
23	3	MOTOR BRACKET UNIT	1		VEMS0045	
24	6	VHF CHANNEL FILM	1		VGKS0545	
25	7	UHF CHANNEL FILM	1		VGKS0549	
26	4	CASSETTE GUIDE	1		VGQS0128	
27	5	FRONT PANEL HOLDER PIECE	3		VGQS0224	
28	6	FILM HOLDER	1		VGQS0258	
29	6	O.T.R BUTTON	1		VGUS0286	
30	6	TIMER OPERATION BUTTON	1		VGUS0287	
31	6	CHANNEL SELECT BUTTON	1		VGUS0288	
32	6	OPERATION BUTTON -POWER	1		VGUS0289	
33	6	OPERATION BUTTON -REWIND	1		VGUS0290	
34	6	OPERATION BUTTON -PLAY	1		VGUS0291	
35	6	OPERATION BUTTON -F.F/SEARCH	1		VGUS0292	
36	6	OPERATION BUTTON -RECORD	1		VGUS0293	
37	6	OPERATION BUTTON -EJECT	1		VGUS0294	
38	6	OPERATION BUTTON -STOP	1		VGUS0295	
39	6	OPERATION BUTTON -PAUSE	1		VGUS0296	
40	6	OPERATION BUTTON -F. ADV	1		VGUS0297	
41	6	TIMER BUTTON	1		VGUS0298	
42	6	TV/VCR SELECT BUTTON	1		VGUS0299	
43	7	TWIN LEAD CONNECTOR	1		VJA0102	
44	7	F-F CABLE	1		VJA0147	
45	5	CUSHION	2		VKAS0011	
46	6	CASSETTE COVER	1		VYFS1544	
47	6	TUNING KNOB PANEL	1		VKFS0147	
48	6	TOP COVER	1		VKMS0035	
49	3	SWITCH HOLDER	1		VMAS0471	
50	1	SENSOR LED ANGLE	1		VMAS0485	

Item No.	Drawing No.	Description	Pcs/ Set	Availability	Part No.	Remark
51	4	CASSETTE COMPARTMENT	1		VMAS0850	
		SUPPORT ANGLE -REAR				
52	1	SHAFT HOLDER PLATE	2		VMAS0545	
53	1	CASSETTE OPENER COVER	1		VMAS0694	
54	1	CASSETTE OPENER ANGLE	1		VMAS0700	
55	2	GROUNDING PLATE	1		VMAS0748	
56	3	THRUST HOLDER	1		VMAS0751	
57	3	MOTOR ANGLE	1		VMAS0753	
58	5	MAIN C.B.A ANGLE -CENTRE	1		VMAS0754	
59	2	GROUNDING ANGLE	1		VMAS0755	
60	5	TOP COVER ANGLE	1		VMAS0756	
61	5	MAIN C.B.A ANGLE -FRONT	1		VMAS0758	
62	5	MAIN C.B.A ANGLE -REAR	1		VMAS0773	
63	4	TRANSISTOR ANGLE	1		VMAS0779	
64	5	MAIN C.B.A ANGLE -RIGHT	1		VMAS0784	
65	4	CHASSIS ANGLE L UNIT	1		VMAS0810	
66	2	CASSETTE HOLDER ANGLE	1		VMAS0811	
67	4	ADJUST HOOK	1		VMA4086	
68	2	LEVER PUSH PLATE	1		VMA4095	
69	3	TRANSISTOR BRACKET -R	1		VMA4096	
70	1	SUPPLY INERTIA SPRING	1		VMBS0071	
71	4	SOFT BRAKE SPRING -1	1		VMBS0090	
72	4	SOFT BRAKE SPRING -2	1		VMBS0091	
73	2	BRAKE ARM SPRING	1		VMBS0092	
74	2	BRAKE GUIDE SPRING	1		VMBS0093	
75	4	T.C LINK SPRING -2	1		VMBS0094	
76	3	CONTROL LEVER SPRING	1		VMBS0095	
77	1	F.F IDLER SPRING	1		VMBS0096	
78	1	F.F LEVER SPRING	1		VMBS0098	
79	2	CAM SPRING	1		VMBS0101	
80	2	TENSION SPRING	1		VMBS0107	
81	2	F.F CANCEL ARM SPRING	1		VMBS0109	
82	2	KICK LEVER SPRING	1		VMBS0127	
83	2	LOCK LEVER SPRING	1		VMBS0257	
84	2	EJECT LEVER SPRING	1		VMBS0258	
85	4	CASSETTE HOLDING SPRING	2		VMBS0259	
86	4	HOLDER SPRING R	1		VMBS0268	
87	4	HOLDER SPRING L	1		VMBS0269	
88	1	POST SPRING -P.4	1		VMBS0288	
89	1	ADJUST SPRING	1		VMB0404	
90	2	BRAKE ARM SPRING	1		VMB0661	
91	1	FRICTION LEVER SPRING	1		VMB0664	
92	1	ERASE HEAD LEVER SPRING	1		VMB0665	
93	1	A/C HEAD SPRING	1		VMB0668	
94	1	LOADING SPRING	2		VMB0669	
95	3	EJECT SPRING	1		VMB0677	
96	2	PRESSURE ROLLER SPRING	1		VMB0679	
97	2	ADJUST SPRING	1		VMB0680	
98	3	PLAY IDLER SPRING	1		VMB0681	
99	3	PLAY IDLER COIL SPRING	1		VMB0683	
100	4	DISTINCTION LEVER SPRING	1		VMB0734	
101	2	KICK LEVER SPRING	1		VMB0749	
102	1	LOCK BASE UNIT	2		VMDS0031	
103	3	CASSETTE SUPPORT BRACKET	1		VMDS0048	
104	1	INERTIA ROLLER UPPER LIMITER	1		VMDS0063	
105	2	FASTENER HOOK	1		VMDS0162	
106	3,4	TRANSISTOR HOLDER -R	2		VMD0091	
107	3	OIL POOL	1		VMD0104	

Item No.	Drawing No.	Description	Pcs/ Set	Availa- bility	Part No.	Remark
108	6	OPERATION BUTTON SPRING	9		VMBS0256	
109	1	FRICTION RUBBER	1		VMG0210	
110	2	F.F CONTROL LEVER	1		VMLS0118	
111	2	BRAKE CAM LEVER	1		VMLS0124	
112	2	F.F CANCEL ARM	1		VMLS0128	
113	2	KICK CAM	1		VMLS0144	
114	2	KICK LEVER	1		VMLS0148	
115	2	SECTOR GEAR HOLDER PLATE	1		VMLS0241	
116	4	SUB ARM -L	1		VMLS0260	
117	2	LOCK LEVER	1		VMLS0276	
118	2	EJECT LEVER	1		VMLS0277	
119	3	PLAY IDLER LEVER	1		VMLS0280	
120	2	T.C LINK	1		VMLS0281	
121	4	SUB ARM R	1		VMLS0287	
122	1	ERASE HEAD LEVER	1		VMLS0290	
123	1	FRICTION LEVER	1		VML1026	
124	2	KICK LEVER -A	1		VML1114	
125	2	KICK LEVER -B	1		VML1115	
126	1	COLLAR	1		VMXS0035	
127	1,4	ST WASHER	2		VMXS0042	
128	2	SPACER	1		VMXS0049	
129	2	SLIDE WASHER	3		VMXS0050	
130	3	SLIDE WASHER	1		VMXS0052	
131	3	WASHER	2		VMXS0098	
132	2	SLIDE WASHER F	3		VMXS0109	
133	1	POST CAP -P.4	1		VMX0271	
134	1	LIMITER SUPPORTER	1		VMXS0321	
135	1	POST SLEEVE -P.4	1		VMXS0322	
136	2	SLIDE WASHER -A	2		VMX0122	
137	4	LOCK COLLAR	1		VMX0247	
138	3	OIL SEAL	1		VMX0251	
139	1	ARM SLEEVE	2		VMX0257	
140	3	IDLER WASHER	1		VMX0261	
141	3	CAPSTAN THRUST WASHER	1		VMX0265	
142	2	GEAR PIPE	1		VMX0268	
143	7	POLYETHYLENE BAG	1		VPFS0029	
144	7	PACKING CASE	1		VPGS0685	
145	7	RIGHT CUSHION -TOP	1		VPNS0094	
146	7	LEFT CUSHION -TOP	1		VPNS0095	
147	7	RIGHT CUSHION -BOTTOM	1		VPNS0096	
148	7	LEFT CUSHION -BOTTOM	1		VPNS0097	
149	7	FAN BAG	1		VQFS0427	
150	6	TUNING EXPLANATION LABEL	1		VQLS0693	
151	5	FUSE CAUTION LABEL	1		VQLS0768	
152	6	BOTTOM CAUTION LABEL	1		VQLS0698	
153	6	STICKER	1		VQLS0722	
154	3	HEAD AMP GROUNDING PLATE	1		VSCS0271	
155	5	BOTTOM GROUNDING PLATE	1		VSCS0272	
156	5	BOTTOM GROUNDING PLATE	1		VSCS0273	
157	1	SHIELD CASE	1		VSCS0296	
158	2	EJECT SOLENOID UNIT	1		VJS0009	
159	2	SAFETY SWITCH	1		VMS0004	
160	7	REMOTE CONTROL BOX	1		VQS0232	
161	7	VHF MATCHING BOX	1		VSQ0055	
162	7	VHF ANTENNA ADAPTOR	1		VSQ0057	
163	3	F.F PULLEY KIT	1		VVXS0025	

Item No.	Drawing No.	Description	Pcs/ Set	Availa- bility	Part No.	Remark
164	1	ROLLER POST UNIT	2		VXAS0344	
165	1	GUIDE BASE UNIT	1		VXAS0433	
166	1	LOADING BASE 1 UNIT	1		VXAS0435	
167	1	LOADING POST L UNIT	1		VXAS0437	
168	1	LOADING POST R UNIT	1		VXAS0439	
169	1	DEW DETECTOR ANGLE UNIT	1		VXAS0441	
170	3	TAKEUP PHOTO TR BRACKET	1		VXAS0443	
171	2	MAIN ROD 1 UNIT	1		VXAS0506	
172	2	SUB ROD 1 UNIT	1		VXAS0446	
173	4	SUPPLY PHOTO TR BRACKET	1		VXAS0452	
174	2	LOCK ANGLE 1 UNIT	1		VXAS0453	
175	4	CHASSIS ANGLE R 1 UNIT	1		VXAS0458	
176	4	CASSETTE HOLDER 1 UNIT	1		VXAS0462	
177	4	CASSETTE UP UNIT	1		VXAS0466	
178	1	DISCHARGE ANGLE UNIT	1		VXBS0017	
179	3	CAPSTAN HOLDER UNIT	1		VXDS0011	
180	1	F.F IDLER LEVER UNIT	1		VXLS0112	
181	2	SELECTOR GEAR UNIT	1		VXLS0132	
182	1	LOADING ARM R UNIT	1		VXLS0200	
183	1	LOADING ARM L UNIT	1		VXLS0201	
184	1	F.F IDLER ARM 1 UNIT	1		VXLS0239	
185	2	PRESSURE ROLLER UNIT	1		VXLS0243	
186	2	TENSION ARM UNIT	1		VXLS0248	
187	3	PLAY IDLER LEVER	1		VXL0747	
188	1	F.F IDLER UNIT	1		VXPS0054	
189	3	CAPSTAN UNIT	1		VXPS0092	
190	2	REWIND GEAR UNIT	1		VXPS0108	
191	4	COUNTER PULLEY UNIT	1		VXPS0110	
192	1	LOADING GEAR UNIT	2		VXP0325	
193	3	PLAY IDLER 1 UNIT	1		VXP0331	
194	3	PAUSE BRAKE PULLEY UNIT	1		VXP0332	
195	2	TAKEUP REEL TABLE UNIT	1		VXRS0014	
196	2	SUPPLY REEL TABLE UNIT	1		VXRS0013	
197	2	SOFT BRAKE UNIT	1		VXZS0014	
198	4	DUMPER	1		VXZS0039	
199	2	BRAKE L UNIT	1		VXZS0044	
200	2	BRAKE R UNIT	1		VXZS0045	
201	2	TENSION BAND UNIT	1		VXZS0047	
202	4	SOFT BRAKE T UNIT	1		VXZS0050	
203	6	BOTTOM PANEL UNIT	1		VYFS0039	
204	6	FRONT PANEL 1 UNIT	1		VYPS1457	
205	6	FILM HOLDER UNIT	1		VYQS0023	
206	1	SCREW 2.6 x 6	1		XSS26 + 6S	
207	5	TUNING V.R KNOB	12		NBS540K	
208	2	CLAMPER	1		PEC-034-0	
209	3	CLAMPER	2		SCF-2011S	
210	1,3	FASTENER	3		TYB-23M	
211	5	TRAKING V.R PANEL	1		VGPS0533	
212	5	TRAKING V.R KNOB	1		VGTS0102	
213	1	SCREW	3		VHDS0016	
214	2	SCREW	1		VHDS0022	
215	1	A/C HEAD SCREW	1		VHDS0025 or	
216	1	SCREW WITH WASHER	2		VHDS0032	
217	1	LOCK SCREW	2		VHDS0024	
218	1	ADJUST SCREW	1		VHD0054	
219	6	CASSETTE COVER SCREW	2		VHD0055	







Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
Q7005	2SD636 (Q,R)		1	
Q7006,7007	2SB642 (Q,R)		2	
Q7008	2SD637 (C,R)		1	
Q7009	2SB644 (Q,R)		1	
Q7010	2SD636 (R,S)		1	
Q7011	2SA950 (Y) or 2SB643 (Q,R,S)		1	
Q7012	2SD636 (R,S)		1	
Q8001,8002	2SD636 (Q,R,S)		2	
Q8004	2SD636 (Q,R,S)		1	
Q8006	2SD636 (Q,R,S)		1	
		Diodes		
D1001-1004	EM1Y or ERB12-01		4	⚠
D1005	MA4068L		1	
D1006	MA165		1	
D1007	PH1 or ERB43-04G		1	⚠
D1008	EK04 ER481-004		1	⚠
D1009,1010	MA165		2	
D1011	PH1 or ERB43-04G		1	⚠
D1012	MA165		1	
D1013	MA4051M		1	
D1014,1015	MA165		2	
D3001	MA165 or 1SS119		1	
D3002	MA1110 or RD11EB or RD5.6EB	Zener	1	
D3003	MA1030 or RD3.0EB	Zener	1	
D3004	EQA02-10C or EQA02-10D or MA1110 or RD11EB	Zener	1	
D3005-3008	MA165 or 1SS119		4	
D3010-3014	MA165 or 1SS119		5	
D3015	MA4062	Zener	1	
D7003	MA165 or 1SS119		1	
D7004	MA166		1	
D7005	MA166C		1	
D7006	EQA02-05-D or RD5.1EB2	Zener	1	
D7007	MA165 or 1SS119		1	
D8001,8002	MA165 or 1SS119		2	
		Resistors		
R1001	ERDS2TJ561	560	1	
R1002,1003	ERDS2TJ472	4.7K	2	
R1004	ERDS2TJ561	560	1	
R1005	ERDS2TJ473	47K	1	
R1006	ERDS2TJ103	10K	1	
R1007	ERDS1FJ180	1/2W	1	⚠
R1008	ERDS2TJ103	10K	1	
R1009	ERDS2TJ681	680	1	
R1010	ERDS1FJ180	1/2W	1	⚠
R1011	ERDS2TJ473	47K	1	
R1012	ERDS2TJ103	10K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R1013-1015	ERDS2TJ104	100K	3	
R1016	ERDS2TJ103	10K	1	
R1017	ERDS2TJ473	47K	1	
R1018	ERDS2TJ101	100	1	
R1019,1020	ERDS2TJ3R3	3.3	2	
R1021	ERDS2TJ102	1K	1	
R1022	ERDS2TJ101	100	1	
R1023,1024	ERDS2TJ473	47K	2	
R1025	ERG1SJ221	Metal Oxide 1W	220	1
R1026	ERDS2TJ562	5.6K	1	
R1027	ERDS2TJ220	22	1	
R1029	ERDS2TJ330	33	1	
R1030	ERDS2TJ562	5.6K	1	
R3001	ERDS2TJ562	5.6K	1	
R3002,3003	ERDS2TJ102	1K	2	
R3004	ERDS2TJ821	820	1	
R3005	ERDS2TJ682	6.8K	1	
R3006	ERDS2TJ332	3.3K	1	
R3007	ERDS2TJ562	5.6K	1	
R3008	ERDS2TJ222	2.2K	1	
R3009	ERDS2TJ392	3.9K	1	
R3010	ERDS2TJ472	4.7K	1	
R3011	ERDS2TJ272	2.7K	1	
R3012,3013	ERDS2TJ333	33K	2	
R3014	ERDS2TJ182	1.8K	1	
R3015	ERDS2TJ103	10K	1	
R3016	EVNE4AA00B14	Variable	10K	1
R3017	EVNE4AA00B24	Variable	20K	1
R3018	EVNE4AA00B14	Variable	10K	1
R3019	ERDS2TJ822	8.2K	1	
R3020	ERDS2TJ473	47K	1	
R3021	ERDS2TJ471	470	1	
R3022	ERDS2TJ823	82K	1	
R3023	ERDS2TJ273	27K	1	
R3024	ERDS2TJ224	220K	1	
R3025,3026	ERDS2TJ561	560	2	
R3027	EVNE4AA00B24	Variable	20K	1
R3029	ERDS2TJ563	56K	1	
R3030	EVNE4AA00B24	Variable	20K	1
R3031	EVNE4AA00B23	Variable	2K	1
R3032	ERDS2TJ820	82	1	
R3033	ERDS2TJ821	820	1	
R3034	ERDS2TJ122	1.2K	1	
R3035	ERDS2TJ222	2.2K	1	
R3036	ERDS2TJ681	680	1	
R3037,3038	ERDS2TJ100	10	2	
R3039	ERDS2TJ271	270	1	
R3040	ERDS2TJ391	390	1	
R3041	ERDS2TJ471	470	1	
R3042	ERDS2TJ331	330	1	
R3043	ERDS2TJ151	150	1	
R3044	ERDS2TJ152	1.5K	1	
R3045	ERDS2TJ222	2.2K	1	
R3048	ERDS2TJ182	1.8K	1	
R3049,3050	ERDS2TJ152	1.5K	2	
R3051	ERDS2TJ821	820	1	
R3052	ERDS2TJ152	1.5K	1	
R3053	ERDS2TJ561	560	1	
R3054	ERDS2TJ103	10K	1	
R3055	ERDS2TJ102	1K	1	
R3056,3057	ERDS2TJ391	390	2	
R3058	ERDS2TJ221	220	1	
R3059,3060	ERDS2TJ102	1K	2	
R3061	ERDS1TJ750	1/2W	75	1
R3062	ERDS2TJ103	10K	1	
R3064	ERDS2TJ471	470	1	
R3065	ERDS2TJ561	560	1	
R3066	ERDS2TJ183	18K	1	
R3067	ERDS2TJ123	12K	1	
R3070	ERDS2TJ223	22K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R3071	ERDS2TJ564	560K	1	
R3072	ERDS2TJ681	680	1	
R3073	ERDS2TJ100	10	1	
R3074	ERDS2TJ222	2.2K	1	
R3075	ERDS2TJ122	1.2K	1	
R3076	ERDS2TJ103	10K	1	
R3077	ERDS2TJ182	1.8K	1	
R3078	ERDS2TJ562	5.6K	1	
R3079	ERDS2TJ223	22K	1	
R3080	ERDS2TJ222	2.2K	1	
R3083	ERDS2TJ103	10K	1	
R3084	ERDS2TJ122	1.2K	1	
R3085	ERDS2TJ392	3.9K	1	
R3086	ERDS2TJ102	1K	1	
R3087	ERDS2TJ183	18K	1	
R3088	ERDS2TJ103	10K	1	
R3089	ERDS2TJ562	5.6K	1	
R3090	ERDS2TJ122	1.2K	1	
R3091	EVNE4AA00B23	Variable	2K	1
R3092	ERDS2TJ332	3.3K	1	
R3093	ERDS2TJ102	1K	1	
R3094	ERDS2TJ221	220	1	
R3095	ERDS2TJ102	1K	1	
R3096	ERDS2TJ471	470	1	
R3097	ERDS2TJ271	220	1	
R3098	ERDS2TJ391	390	1	
R3099	ERDS2TJ103	10K	1	
R3100	ERDS2TJ102	1K	1	
R3101	ERDS2TJ332	3.3K	1	
R3102	ERDS2TJ560	56	1	
R3103	ERDS2TJ221	220	1	
R3104	ERDS2TJ561	560	1	
R3105	ERDS2TJ102	1K	1	
R3106	ERDS2TJ103	10K	1	
R3107	ERDS2TJ102	1K	1	
R3108	ERDS2TJ332	3.3K	1	
R3109	ERDS2TJ221	220	1	
R3110	ERDS2TJ560	56	1	
R3111	ERDS2TJ103	10K	1	
R3112	ERDS2TJ820	82	1	
R3113	ERDS2TJ561	560	1	
R3114-3116	ERDS2TJ102	1K	3	
R3117	ERDS2TJ101	100	1	
R3119	ERDS2TJ391	390	1	
R3120	ERDS2TJ272	2.7K	1	
R3121	ERDS2TJ562	5.6K	1	
R3122	ERDS2TJ223	22K	1	
R3123	ERDS2TJ102	1K	1	
R3124	ERDS2TJ222	2.2K	1	
R3125	ERDS2TJ273	27K	1	
R3126	ERDS2TJ472	4.7K	1	
R3127, 3128	ERDS2TJ102	1K	2	
R3129	ERDS2TJ103	10K	1	
R3132	ERDS2TJ564	560K	1	
R7001	ERDS2TJ154	150K	1	
R7002	ERDS2TJ224	220K	1	
R7003	ERDS2TJ473	47K	1	
R7004-7006	ERDS2TJ223	22K	3	
R7007	ERDS2TJ561	560	1	
R7008	ERDS2TJ273	27K	1	
R7009	ERDS2TJ333	33K	1	
R7016	ERDS2TJ223	22K	1	
R7017	ERDS2TJ473	47K	1	
R7018	ERDS2TJ104	100K	1	
R7020	ERDS2TJ103	10K	1	
R7021	ERDS2TJ224	220K	1	
R7022	ERDS2TJ822	8.2K	1	
R7023	AVNE4AAB472 or EVNE4AAB0B53	Variable	4.7K	1
R7024	ERDS2TJ472	4.7K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R7025	EROS2TKG4702	Precision Metal Film 47K	1	
		+2%		
R7026	EROS2TKG5602	Precision Metal Film 56K	1	
		+2%		
R7027	ERDS1FJ820	1/2W 82	1	▲
R7028	ERDS2TJ222	2.2K	1	
R7029	ERDS2TJ333	33K	1	
R7030	ERDS2TJ104	100K	1	
R7031	ERDS2TJ333	33K	1	
R7032	ERDS2TJ104	100K	1	
R7033	ERDS2TJ222	2.2K	1	
R7034	ERDS2TJ154	150K	1	
R7035	ERDS2TJ474	470K	1	
R7036	ERDS2TJ331	330	1	
R7037	ERDS2TJ472	4.7K	1	
R7039	ERDS2TJ273	27K	1	
R7040	ERDS2TJ473	47K	1	
R7042	ERDS2TJ681	680	1	
R7043	ERDS2TJ822	8.2K	1	
R7044	ERDS2TJ103	10K	1	
R7045	ERDS2TJ105	1M	1	
R7046	ERDS2TJ333	33K	1	
R7047	ERDS2TJ222	2.2K	1	
R7048	ERDS2TJ101	100	1	
R8001	ERDS2TJ222	2.2K	1	
R8002	ERDS2TJ102	1K	1	
R8003	ERDS2TJ123	12K	1	
R8004	ERDS2TJ103	10K	1	
R8005	ERDS2TJ681	680	1	
R8006	ERDS2TJ820	82	1	
R8007	ERDS2TJ471	470	1	
R8008	ERDS2TJ822	8.2K	1	
R8009-8011	ERDS2TJ391	390	3	
R8012	AVNE4AA00B53	Variable	5K	1
R8013	ERDS2TJ271	270	1	
R8014	ERDS2TJ332	3.3K	1	
R8015	ERDS2TJ273	27K	1	
R8016	ERDS2TJ561	560	1	
R8017	ERDS2TJ223	22K	1	
R8018	AVNE4AA00B24	Variable	20K	1
R8019	ERDS2TJ102	1K	1	
R8022	ERDS2TJ682	6.8K	1	
R8023	ERDS2TJ102	1K	1	
R8024	ERDS2TJ122	1.2K	1	
R8025	ERDS2TJ102	1K	1	
R8026	ERDS2TJ222	2.2K	1	
R8027	ERDS2TJ822	8.2K	1	
R8028, 8029	ERDS2TJ682	6.8K	2	
R8030	ERDS2TJ272	2.7K	1	
R8031	ERDS2TJ222	2.2K	1	
R8032	ERDS2TJ821	820	1	
R8033	ERDS2TJ102	1K	1	
R8034	EVNE4AA00B13	Variable	1K	1
R8035	ERDS2TJ333	33K	1	
R8036, 8037	ERDS2TJ103	10K	2	
R8038	ERDS2TJ181	180	1	
R8039	ERDS2TJ821	820	1	
R8042	ERDS2TJ102	1K	1	
R8043	ERDS2TJ333	33K	1	
R8044	ERDS2TJ151	150	1	
R8045	ERDS2TJ181	180	1	
R8046	ERDS2TJ103	10K	1	
R8047	ERDS2TJ153	15K	1	
R8048	ERDS2TJ822	8.2K	1	
R8049	ERDS2TJ153	15K	1	
R8051	ERDS2TJ562	5.6K	1	

Ref. No.	Part No.	Part Name & Description	Fcs / Set	Remarks
		Capacitors		
C1001	ECEB1EU682	Electrolytic 25V 6800	1	
C1002	ECEA50ZR47	Electrolytic 50V 0.47	1	
C1003	ECKW1H101KB5	Ceramic 50V 100P	1	
C1005	ECEA1HS010	Electrolytic 50V 1	1	
C1006	ECEA1EG221S	Electrolytic 25V 220	1	
C1007	ECEA1ES100	Electrolytic 25V 10	1	
C1008	ECKW1H222KB5	Ceramic 50V 0.0022	1	
C1009	ECEA1HG010S	Electrolytic 50V 1	1	
C1010	VCYW1E104KX	Ceramic 25V 0.1	1	
C1011	ECEA1HG100S	Electrolytic 50V 10	1	
C1012	ECKW1H472ZF	Ceramic 50V 0.0047	1	
		+80% -20%		
C1013	ECEA0JF102X	Electrolytic 6V 1000	1	
C1014	ECEA1HG470S	Electrolytic 50V 47	1	
C1015	ECEA0JS102	Electrolytic 6.3V 1000	1	
C1016	ECKW1H472ZF	Ceramic 50V 0.0047	1	
		+80% -20%		
C1017	ECEA1HG470S	Electrolytic 50V 47	1	
C1018	ECEA1HS470	Electrolytic 50V 47	1	
C1019	ECEA0JS101	Electrolytic 6.3V 100	1	
C3001	ECEA0JS470	Electrolytic 6.3V 47	1	
C3002	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C3003	ECEA1HS010	Electrolytic 50V 1	1	
C3004	ECEA1ES4R7	Electrolytic 25V 4.7	1	
C3005	ECEA1HNR22	Electrolytic 50V 0.22	1	
C3006	VCYST50271KB	Ceramic 50V 270P	1	
C3007	VCYST50180JC	Ceramic 50V 18P	1	
		+5%		
C3008	VCYST50121JB	Ceramic 50V 120P	1	
		+5%		
C3009	VCYST50103NY	Ceramic 50V 0.01	1	
		+30%		
C3010	ECEA1HN010	Electrolytic 50V 1	1	
C3011	ECEA0JS470	Electrolytic 6.3V 47	1	
C3012	ECEA1HS2R2	Electrolytic 50V 2.2	1	
C3013	VCYST50103NY	Ceramic 50V 0.01	1	
		+30%		
C3014	VCYST50121JB	Ceramic 50V 120P	1	
		+5%		
C3015	ECEA0JS470	Electrolytic 6.3V 47	1	
C3016	VCYST50390JR	Ceramic 50V 39P	1	
		+5%		
C3017,3018	VCYST50103NY	Ceramic 50V 0.01	2	
		+30%		
C3019	VCYST50680J	Ceramic 50V 68P	1	
		+5%		
C3020	ECKW1H331KB5	Ceramic 50V 330P	1	
C3021	VCYST50103NY	Ceramic 50V 0.01	1	
		+30%		
C3022	VCYST50820J	Ceramic 50V 82P	1	
		+5%		
C3023	ECEA0JS470	Electrolytic 6.3V 47	1	
C3024	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C3025	VCYST50103NY	Ceramic 50V 0.01	1	
		+30%		
C3026	VCYW1C104MX	Ceramic 16V 0.1	1	
		+20%		
C3027	ECEA0JK470	Electrolytic 6.3V 47	1	
C3028	VCYW1C104MX	Ceramic 16V 0.1	1	
		+20%		
C3029	ECEA1HK010	Electrolytic 50V 1	1	
C3030	ECEA1EK4R7	Electrolytic 25V 4.7	1	
C3031	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C3032,3033	ECCW1H150JC5	Ceramic 50V 15P	2	
		+5%		

Ref. No.	Part No.	Part Name & Description	Fcs / Set	Remarks
C3034	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C3035	ECEA1EK4R7	Electrolytic 25V 4.7	1	
C3036	ECEA0JS470	Electrolytic 6.3V 47	1	
C3037	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C3038	ECEA0JK470	Electrolytic 6.3V 47	1	
C3039	ECCW1H220JC5	Ceramic 50V 22P	1	
		+5%		
C3040	ECCW1H270JC5	Ceramic 50V 27P	1	
		+5%		
C3041	ECCW1H560JC5	Ceramic 50V 56P	1	
		+5%		
C3042,3043	ECKW1H103ZF5	Ceramic 50V 0.01	2	
		+80% -20%		
C3044	ECKW1H561KB5	Ceramic 50V 560P	1	
C3045	ECKW1H681KB5	Ceramic 50V 680P	1	
C3046	ECCW1H121JC5	Ceramic 50V 120P	1	
		+5%		
C3047	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C3048	ECCW1H560JC5	Ceramic 50V 56P	1	
		+5%		
C3049	ECCW1H121JC5	Ceramic 50V 120P	1	
		+5%		
C3050	ECKW1H681KB5	Ceramic 50V 680P	1	
C3051	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C3052	ECEA0JS471	Electrolytic 6.3V 470	1	
C3053	ECEA1CS101	Electrolytic 16V 100	1	
C3055	VCYW1C104KX	Ceramic 16V 0.1	1	
C3057	ECEA0JS471	Electrolytic 6.3V 470	1	
C3058	ECEA1ES4R7	Electrolytic 25V 4.7	1	
C3059	ECKW1H122KB5	Ceramic 50V 0.0012	1	
C3060	ECEA1CS100	Electrolytic 16V 10	1	
C3061	ECCW1H151JC5	Ceramic 50V 150P	1	
		+5%		
C3062,3063	ECKW1H102KB5	Ceramic 50V 0.001	2	
C3064	ECCW1H121JC5	Ceramic 50V 120P	1	
		+5%		
C3065	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C3066	ECCW1H101JC5	Ceramic 50V 100P	1	
		+5%		
C3067	VCYW1E473KX	Ceramic 25V 0.047	1	
C3068	ECKW1H222ZF5	Ceramic 50V 0.0022	1	
		+80% -20%		
C3069	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C3070	ECCW1H330JC5	Ceramic 50V 33	1	
		+5%		
C3071	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C3072	ECCW1H150JC5	Ceramic 50V 15P	1	
		+5%		
C3073	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C3074	ECCW1H470JC5	Ceramic 50V 47P	1	
		+5%		
C3075,3076	ECEA0JS470	Electrolytic 6.3V 47	2	
C3077	ECEA0JS101	Electrolytic 6.3V 100	1	
C3078	ECCW1H181JC5	Ceramic 50V 180P	1	
		+5%		

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
C3079	ECCW1H102J5 or	Ceramic 50V 0.001	1		C8004	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+5%					+80% -20%		
	ECKW1H102JB				C8005	ECEA1ES3R3	Electrolytic 25V 3.3	1	
C3080	ECCW1H561J5	Ceramic 50V 560P	1		C8006	VCYST50103NY	Ceramic 50V 0.01	1	
		+5%					+80% -20%		
C3081	ECCW1H681J5	Ceramic 50V 680P	1		C8007,8008	ECKW1H103ZF5	Ceramic 50V 0.01	2	
		+5%					+80% -20%		
C3082	ECCW1H181JC5	Ceramic 50V 180P	1		C8009	VCYW1C104MX	Ceramic 16V 0.1	1	
		+5%					+20%		
C3083	ECCW1H330JC5	Ceramic 50V 33P	1		C8010	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+5%					+80% -20%		
C3084,3085	ECCW1H680JC5	Ceramic 50V 68P	2		C8011	ECCW1H151JC5	Ceramic 50V 150P	1	
		+5%					+5%		
C3086	VCYST50103NY	Ceramic 50V 0.01	1		C8012	ECKW1H222ZF5	Ceramic 50V 0.0022	1	
		+80% -20%					+80% -20%		
C3087	ECKW1H102KB5	Ceramic 50V 0.001	1		C8013	VCYW1C104MX	Ceramic 16V 0.1	1	
C3088	ECCW1H150JC5	Ceramic 50V 15P	1				+20%		
		+5%			C8014	VCYW1E103KX	Ceramic 16V 0.01	1	
C3089	VCYW1C104MX	Ceramic 16V 0.1	1		C8015	ECEA1CS100	Electrolytic 16V 10	1	
		+20%			C8016	ECKW1H221KB5	Ceramic 50V 220P	1	
C3090	ECCW1H050CC5	Ceramic 50V 5P	1				+5%		
		+0.25P			C8017	ECKW1H103ZF5	Ceramic 50V 0.01	1	
C3091	ECKW1H102KB5	Ceramic 50V 0.001	1				+80% -20%		
C3092	ECKW1H103ZF5	Ceramic 50V 0.01	1		C8018	ECCW1H680JC5	Ceramic 50V 68P	1	
		+80% -20%					+5%		
C3094	ECKW1H103ZF5	Ceramic 50V 0.01	1		C8019	ECKW1H221KB5	Ceramic 50V 220P	1	
		+80% -20%					+5%		
C3095	VCYST50271KB	Ceramic 50V 270P	1		C8020	ECKW1H103ZF5	Ceramic 50V 0.01	1	
C3096	VCYST50151KB	Ceramic 50V 150P	1				+80% -20%		
C3097	VCYST50103NY	Ceramic 50V 0.01	1		C8021	ECCW1H470JC5	Ceramic 50V 47P	1	
		+30%					+5%		
C3098	ECKW1H681KB5	Ceramic 50V 680P	1		C8023	ECCW1H680JC5	Ceramic 50V 68P	1	
C3101-3104	VCYST50103NY	Ceramic 50V 0.01	4				+5%		
		+30%			C8024,8025	ECKW1H472ZF5	Ceramic 50V 0.0047	2	
							+80% -20%		
C3106	ECKW1H103ZF5	Ceramic 50V 0.01	1		C8026	ECEA1CS100	Electrolytic 16V 10	1	
		+80% -20%							
C3108	VCYW1C104KX	Ceramic 16V 0.1	1		C8027	VCYW1C104MX	Ceramic 16V 0.1	1	
C3109	VCYW1E393KX	Ceramic 25V 0.039	1				+20%		
					C8028	ECKW1H103ZF5	Ceramic 50V 0.01	1	
							+80% -20%		
C7001	ECEA50ZR15	Electrolytic 50V 0.15	1		C8029	VCYST50103NY	Ceramic 50V 0.01	1	
C7007	ECEA1ES4R7	Electrolytic 25V 4.7	1				+30%		
C7008	ECEA1ES220	Electrolytic 25V 22	1		C8030	ECKW1H103ZF5	Ceramic 50V 0.01	1	
C7009	ECKW1H103ZF5	Ceramic 50V 0.01	1				+80% -20%		
		+80% -20%			C8031	ECEA1HS010	Electrolytic 50V 1	1	
C7010	ECQM1H103KV or	Polyester 50V 0.01	1		C8032	ECEA0JS470	Electrolytic 6.3V 47	1	
	ECQM1H103KZ				C8033	ECKW1H103ZF5	Ceramic 50V 0.01	1	
C7011	ECKW1H103ZF5	Ceramic 50V 0.01	1				+80% -20%		
		+80% -20%			C8034	ECKW1H471KB5	Ceramic 50V 470P	1	
C7012	ECQM1H103KV or	Polyester 50V 0.01	1		C8035	ECKW1H103ZF5	Ceramic 50V 0.01	1	
	ECQM1H103KZ						+80% -20%		
C7013	ECEA1ES3R3	Electrolytic 25V 3.3	1		C8036	ECCW1H050CC5	Ceramic 50V 5P	1	
C7014	ECEA1CS101	Electrolytic 16V 100	1				+0.25P		
C7015	ECEA0JS102	Electrolytic 6.3V 1000	1		C8037	ECKW1H102KB5	Ceramic 50V 0.001	1	
C7016	ECEA1HS010	Electrolytic 50V 1	1		C8038	ECRHA020D11 or	Trimmer 20P	1	
C7017	ECQM1H473KV or	Polyester 50V 0.047	1			MCV03R200ER			
	ECQM1H473KZ				C8039	ECEA0JS221	Electrolytic 6.3V 220	1	
C7020	ECEA1CS470	Electrolytic 16V 47	1		C8040	ECKW1H102KB5	Ceramic 50V 0.001	1	
C7021	ECEA1ES4R7	Electrolytic 25V 4.7	1		C8041	ECKW1H103ZF5	Ceramic 50V 0.01	1	
C7022	ECKW1H103ZF5	Ceramic 50V 0.01	1				+80% -20%		
		+80% -20%			C8042	ECEA0JS470	Electrolytic 6.3V 47	1	
C7023	ECEA1HN2R2S	Electrolytic 50V 2.2	1		C8043	ECKW1H681KB5	Ceramic 50V 680P	1	
C7024	ECEA1ES3R3	Electrolytic 25V 3.3	1		C8044	ECEA1ES4R7	Electrolytic 25V 4.7	1	
C8001	VCYST50103NY	Ceramic 50V 0.01	1		C8046	VCYW1E153KX	Ceramic 16V 0.015	1	
		+30%			C8047	VCYST50680J	Ceramic 50V 68P	1	
C8002	ECEA1ES4R7	Electrolytic 25V 4.7	1				+5%		
C8003	VCYST50103NY	Ceramic 50V 0.01	1		C8048	ECEA0JS470	Electrolytic 6.3V 47	1	
		+30%							



Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		C/R Complex Components		
CR3001	EXRP102K334	50V 0.001 1/8W 330K	1	
CR3002	EXPC120K102	50V 12P 1K	1	
		Delay Lines		
DL3001	EFDEN645A12P or VLDS0003		1	
DL8001	EFDEN645B22B or VLD0013		1	
		Filters		
FL3001	ELB5G014 or VLFS0003		1	
FL8001	ELB5G029 or VLFS0005		1	
		Coils		
L1001,1002	VLQS9H101K	100	2	
L1003,1004	VLQS66F101K	100	2	
L1005,1006	VLQS05R220K	22	2	
L3001	VLQS66R101K	100	1	
L3002	VLQS05R820K	82	1	
L3003	VLQS05R181K or VLQS66R181K	180	1	
L3004	VLQS05R101K	100	1	
L3005	VLQS05R120K	12	1	
L3006	VLQS05R221K or VLQS66R221K	220	1	
L3007	VLQS05R471K or VLQS66R471K	470	1	
L3008	VLQS05R120K or VLQS66R120K	12	1	
L3009	VLQS05R330K or VLQS66R330K	33	1	
L3010	VLQS05R100K or VLQS66R100K	10	1	
L3011	VLQS05R390K or VLQS66R390K	39	1	
L3012	VLQS05R100K or VLQS66R100K	10	1	
L3013	VLQS05R471K or VLQS66R471K	470	1	
L3014	VLQS05R470K or VLQS66R470K	47	1	
L3015	VLQS05R100K or VLQS66R100K	10	1	
L3016,3017	VLQS66R101K	100	2	
L3018	VLQS05R151K or VLQS66R151K	150	1	
L3019-3021	VLQS66R101K	100	3	
L3022	VLQS05R470K or VLQS66R470K	47	1	
L3023	VLQS05R330K or VLQS66R330K	33	1	
L3024	VLQS05R180K or VLQS66R180K	18	1	
L3025,3026	VLQEL05F2R2K	2.2	2	
L7001	VLQSL01101K	100	1	
L8001	VLQS05R221K	220	1	
L8002	VLQS05R181K or VLQS66R181K	180	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
L8003	VLQS66R101K		100	1
L8004,8005	VLQS05R181K or VLQS66R181K		180	2
L8006	VLQS05R390K or VLQS66R390K		39	1
L8007,8008	VLQS66R101K		100	2
L8009	VLQS05R471K		470	1
L8010,8011	VLQS05R150K or VLQS66R150K		15	2
L8012	VLQS05R4R7K or VLQS66R4R7K		4.7	1
		Crystals Oscillator		
X8001	VSX0060		1	
		Transformer		
T1002	ETS19K3A		1	
		Miscellaneous		
	VJF0044	Spacer	1	
		SERVO, AUDIO & SYSTEM CONTROL C.B.A.		
		Integrated Circuits		
IC2001	AN6359		1	
IC2002	MN6168VIB		1	
IC2003	AN90C21		1	
IC2004	AN6356N		1	
IC2005	VCRS0020		1	
IC2006	AN6387		1	
IC2007	AN1358 or AN6562 or $\mu$ PC358C		1	
IC4001	AN90C22		1	
IC4002	$\mu$ PC1513HA		1	
IC4003	$\mu$ PC1514CA		1	
IC6001	M54543L		1	
IC6002	MN15841VKP		1	
		Transistors		
Q2001	2SB641(Q,R,S)		1	
Q2002	2SD636(Q,R,S)		1	
Q2003	2SB641(Q,R,S)		1	
Q2004-2006	2SD636(Q,R,S)		3	
Q2008	2SD636(Q,R,S)		1	
Q4001	2SD636(Q,R,S)		1	
Q4002	2SA950(Y) or 2SB643(R,S)		1	
Q4003	2SD637(Q,R,S)		1	
Q4004,4005	2SD636(Q,R,S)		2	
Q6001-6006	2SD636(Q,R,S)		6	
Q6007	2SB641(Q,R,S)		1	
Q6008	2SD471(X,A) or 2SD471(L,A)		1	
Q6009,6010	2SD636(Q,R,S)		2	
Q6011	2SB641(Q,R,S)		1	
Q6012	2SB643(Q,R,S)		1	
Q6013	2SD636(Q,R,S)		1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
Q6014	2SD638(Q,R,S) or		1	
	2SD639(Q,R,S)			
Q6015-6019	2SD636(Q,R,S)		5	
Q6020	2SB641(Q,R,S)		1	
Q6021	2SD636(Q,R,S)		1	
Q6023	2SB641(Q,R,S)		1	
Q6027	2SC1684(Q,R,S)		1	
Q6950	2SC1847 or		1	
	2SC1847V			
		Diodes		
D2001	MA165 or		1	
	1SS119			
D2002	OA90G		1	
D2003-2005	MA165 or		3	
	1SS119			
D2008	MA165 or		1	
	1SS119			
D2011, 2012	MA165 or		2	
	1SS119			
D2015-2018	MA165		4	
	1SS119			
D2020	MA165 or		1	
	1SS119			
D4001-4003	MA165 or		3	
	1SS119			
D6001	MA1110 or	Zener	1	
	RD11EB			
D6002-6005	MA166		4	
D6006-6019	MA165 or		14	
	1SS119			
D6029, 6030	MA165 or		2	
	1SS119			
D6036	RD5.6EB	Zener	1	
D6039, 6040	MA165 or		2	
	1SS119			
D6042-6045	MA165 or		4	
	1SS119			
D6046-6048	MA166		3	
D6049	MA165		1	
D6051-6059	MA166		9	
D6061-6084	MA165 or		24	
	1SS119			
D6085	ERA81-004		1	
D6086-6088	MA165 or		3	
	1SS119			
D6091	MA165 or		1	
	1SS119			
D6095-6104	MA165 or		10	
	1SS119			
D6950	MA4068L	Zener	1	
D6951	MA1100 or	Zener	1	
	MA1091			
D6952	MA165 or		1	
	1SS119			
		Resistors		
R2001	ERDS2TJ223		22K 1	
R2002	EVJFFAF20B15	Variable	100K 1	
R2003	ERDS2TJ224		220K 1	
R2004	ERDS2TJ124		120K 1	
R2005	ERDS2TJ102		1K 1	
R2006	ERDS2TJ152		1.5K 1	
R2007	ERDS2TJ333		33K 1	
R2008	ERDS2TJ222		2.2K 1	
R2009	ERDS2TJ124		120K 1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R2010	ERDS2TJ333		33K 1	
R2011	ERDS2TJ104		100K 1	
R2012, 2013	EROS2TKG4701	Precision Metal Film	4.7K 2	
			+2%	
R2014	ERDS2TJ154		150K 1	
R2015, 2016	ERDS2TJ104		100K 2	
R2017	ERDS2TJ563		56K 1	
R2018	ERDS2TJ274		270K 1	
R2019, 2020	ERDS2TJ104		100K 2	
R2021	ERDS2TJ474		470K 1	
R2022	ERDS2TJ562		5.6K 1	
R2023	ERDS2TJ103		10K 1	
R2024	ERDS2TJ104		100K 1	
R2025	ERDS2TJ333		33K 1	
R2026	ERDS2TJ102		1K 1	
R2027	ERDS2TJ223		22K 1	
R2028	EVNE4AA00B54	Variable	50K 1	
R2029	EVN38CA00B15	Variable	100K 1	
R2030	ERDS2TJ104		100K 1	
R2031, 2032	ERDS2TJ472		4.7K 2	
R2033, 2034	ERDS2TJ332		3.3K 2	
R2035	ERDS2TJ181		180 1	
R2037	ERDS2TJ104		100K 1	
R2038	ERDS1FJ1R5	1/2W 1.5	1	⚠
R2039	ERDS2TJ223		22K 1	
R2040	ERDS2TJ103		10K 1	
R2041	ERDS2TJ470		47 1	
R2042	ERX12ANJR56	Metal Oxide 1/2W	0.56 1	
R2043, 2044	ERDS2TJ470		47 2	
R2045	EROS2TKG1801	Precision Metal Film	1.8K 1	
			+2%	
R2046	EROS2TKG6801	Precision Metal Film	6.8K 1	
			+2%	
R2047	ERDS2TJ124		120K 1	
R2050	ERDS2TJ333		33K 1	
R2051	ERDS2TJ822		82K 1	
R2052	ERDS2TJ562		5.6K 1	
R2053	ERDS2TJ104		100K 1	
R2054	ERDS2TJ103		10K 1	
R2055	ERDS2TJ473		47K 1	
R2056	ERDS2TJ104		100K 1	
R2057	ERDS2TJ333		33K 1	
R2058	ERDS2TJ562		5.6K 1	
R2059	ERDS2TJ273		27K 1	
R2061	ERDS2TJ104		100K 1	
R2065	ERDS2TJ682		6.8K 1	
R2066	ERDS2TJ123		12K 1	
R2067	ERDS2TJ104		100K 1	
R2068	ERDS2TJ473		47K 1	
R2069	ERDS2TJ105		1M 1	
R2070	ERGLANJ150	Metal Oxide 1W	15 1	
R2071	ERDS2TJ150		15 1	
R2072	ERDS2TJ333		33K 1	
R2073	ERDS2TJ102		1K 1	
R2074	ERDS2TJ823		82K 1	
R4001	ERDS2TJ823		82K 1	
R4002	ERDS2TJ221		220 1	
R4004	ERDS2TJ101		100 1	
R4005	ERDS2TJ223		22K 1	
R4006	ERDS2TJ221		220 1	
R4007	ERDS2TJ182		1.8K 1	
R4008	ERDS2TJ103		10K 1	
R4009	ERDS2TJ333		33K 1	
R4010	ERDS2TJ182		1.8K 1	
R4011	ERDS2TJ223		22K 1	
R4012	ERDS2TJ273		27K 1	
R4013	ERDS2TJ102		1K 1	
R4014	ERDS2TJ820		82 1	
R4015	ERDS2TJ223		22K 1	
R4016	EVNE4AA00B15	Variable	100K 1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R4017	ERDS2TJ472	4.7K	1	
R4018	ERDS2TJ562	5.6K	1	
R4019	ERDS2TJ333	33K	1	
R4020	EVNE4AA00B53	Variable	5K	1
R4021	ERDS2TJ124	120K	1	
R4022	ERDS2TJ181	180	1	
R4023	ERDS2TJ220	22	1	
R4024	EVNE4AA00B23	Variable	2K	1
R4025	ERDS2TJ103	10K	1	
R4026	ERDS2TJ563	56K	1	
R4027	ERDS2TJ562	5.6K	1	
R4028	ERDS2TJ223	22K	1	
R4029	ERDS2TJ333	33K	1	
R4030	ERDS2TJ220	22	1	
R4031	ERDS2TJ221	220	1	
R4032	ERDS2TJ820	82	1	
R6002-6004	ERDS2TJ473	47K	3	
R6005,6006	ERDS2TJ121	120	2	
R6008	ERDS1FJ4R7	1/2W 4.7	1	
R6009	ERDS2TJ333	33K	1	
R6010	ERDS2TJ473	47K	1	
R6011,6012	ERDS2TJ223	22K	2	
R6013	ERDS2TJ123	12K	1	
R6014,6015	ERDS2TJ472	4.7K	2	
R6016-6022	ERDS2TJ223	22K	7	
R6023	ERDS2TJ681	680	1	
R6024,6025	ERDS2TJ562	5.6K	2	
R6026	ERDS2TJ474	470K	1	
R6027	ERDS2TJ223	22K	1	
R6028	ERDS2TJ333	33K	1	
R6029	ERDS2TJ274	270K	1	
R6030	ERDS1TJ910	1/2W 91	1	
R6031	ERDS2TJ102	1K	1	
R6032	ERDS2TJ682	6.8K	1	
R6033	ERDS2TJ392	3.9K	1	
R6034	ERDS2TJ121	120	1	
R6035	ERDS2TJ331	330	1	
R6036	ERDS2TJ303	30K	1	
R6037	ERDS2TJ224	220K	1	
R6038,6039	ERDS2TJ184	180K	2	
R6040	ERDS2TJ333	33K	1	
R6041	EROS2TKG4701	Precision Metal Film 4.7K	1	
		+2%		
R6042	ERDS2TJ274	270K	1	
R6043,6044	ERDS2TJ152	1.5K	2	
R6045	ERDS2TJ562	5.6K	1	
R6046,6047	ERDS2TJ472	4.7K	2	
R6048-6050	ERDS2TJ103	10K	3	
R6051	ERDS2TJ472	4.7K	1	
R6052	EROS2TKG1101	Precision Metal Film 1.1K	1	
		+2%		
R6053	ERDS2TJ332	3.3K	1	
R6054	ERDS2TJ113	11K	1	
R6055	ERDS2TJ682	6.8K	1	
R6056	ERDS2TJ472	4.7K	1	
R6057	ERDS2TJ332	3.3K	1	
R6058	ERDS2TJ223	22K	1	
R6059	ERDS2TJ473	47K	1	
R6060	ERDS2TJ104	100K	1	
R6061	EROS2CKG2202	Precision Metal Film 22K	1	
		+2%		
R6062,6063	ERDS2TJ182	1.8K	2	
R6064	ERDS2TJ103	10K	1	
R6065	ERDS2TJ271	270	1	
R6066	ERDS2TJ104	100K	1	
R6067	ERDS2TJ103	10K	1	
R6068	ERDS2TJ104	100K	1	
R6069	ERDS2TJ682	6.8K	1	
R6070,6071	ERDS2TJ823	82K	2	
R6076,6077	ERDS2TJ392	3.9K	2	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R6078	ERDS2TJ122	1.2K	1	
R6085	ERDS2TJ104	100K	1	
R6086	ERDS2TJ333	33K	1	
R6097-6108	ERDS2TJ473	47K	12	
R6113	ERDS2TJ473	47K	1	
R6114,6115	ERDS2TJ222	2.2K	2	
R6116	ERDS2TJ473	47K	1	
R6117	ERDS2TJ104	100K	1	
R6118	ERDS2TJ103	10K	1	
R6119	ERDS2TJ223	22K	1	
R6120	ERDS2TJ473	47K	1	
R6121	ERDS2TJ104	100K	1	
R6122	ERDS2TJ124	120K	1	
R6124,6125	ERDS2TJ473	47K	2	
R6126	ERDS2TJ103	10K	1	
R6127	ERDS2TJ473	47K	1	
R6129	ERDS2TJ392	3.9K	1	
R6130	ERDS2TJ222	2.2K	1	
R6131	ERDS2TJ333	33K	1	
R6134,6135	ERDS2TJ472	4.7K	2	
R6136	ERDS2TJ392	3.9K	1	
R6137-6140	ERDS2TJ223	22K	4	
R6141	ERDS2TJ472	4.7K	1	
R6142,6143	ERDS2TJ102	1K	2	
R6144	ERDS2TJ182	1.8K	1	
R6145,6146	ERDS2TJ472	4.7K	2	
R6148	ERDS2TJ102	1K	1	
R6149	ERDS2TJ103	10K	1	
R6150	ERDS2TJ223	22K	1	
R6152-6154	ERDS2TJ223	22K	3	
R6155	ERDS2TJ222	2.2K	1	
R6156	ERDS2TJ103	10K	1	
R6157	ERDS2TJ223	22K	1	
R6162	ERDS2TJ331	33K	1	
R6168	ERDS2TJ222	2.2K	1	
R6169	ERDS2TJ332	3.3K	1	
R6170,6171	ERDS2TJ470	47	2	
R6172,6173	ERDS2TJ332	3.3K	2	
R6174	ERDS2TJ333	33K	1	
R6950	ERDS1TJ101	1/2W 100	1	
R6951	ERDS2TJ332	3.3K	1	
		Capacitors		
CX6001	EXFP64712W	Complex Component	1	
		50V 470P		
		+80% -20%		
C2001	ECQM1H563KV or	Polyester 50V 0.056	1	
	ECQM1H563KZ			
C2002	ECEA1HS010	Electrolytic 50V	1	1
C2003	ECEA1ES4R7	Electrolytic 25V	4.7	1
C2004	ECEA1HN010S	Electrolytic 50V	1	1
C2005	ECEA0JS101	Electrolytic 6.3V	100	1
C2006	ECQM1H562KV or	Polyester 50V 0.0056	1	
	ECQM1H562KZ			
C2007	VCYW1E104KX	Ceramic 25V	0.1	1
C2008	ECQM1H562KV or	Polyester 50V 0.0056	1	
	ECQM1H562KZ			
C2009	ECKW1H102KB5	Ceramic 50V	0.001	1
C2010	ECQM1H562KV or	Polyester 50V 0.0056	1	
	ECQM1H562KZ			
C2011	VCYW1E104KX	Ceramic 25V	0.1	1
C2012	ECEA0JS470	Electrolytic 6.3V	47	1
C2013	ECQM1H472KV or	Polyester 50V 0.0047	1	
	ECQM1H472KZ			
C2014	ECEA1HS010	Electrolytic 50V	1	1
C2015	ECEA0JS101	Electrolytic 6.3V	100	1
C2016	ECQM1H223KV or	Polyester 50V 0.022	1	
	ECQM1H223KZ			
C2017	ECQM1H154KV	Polyester 50V	0.15	1
C2018	ECQM1H182KV or	Polyester 50V 0.0018	1	
	ECQM1H182KZ			

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
C2019,2020	ECEA1CS100	Electrolytic 16V	10 2	
C2021	ECEA0JS470	Electrolytic 6.3V	47 1	
C2023	ECEA0JS470	Electrolytic 6.3V	47 1	
C2024	ECEA1HS2R2	Electrolytic 50V	2.2 1	
C2025	ECQMLH682KV or ECQMLH682KZ	Polyester 50V	0.0068 1	
C2026	ECEA1ES221	Electrolytic 25V	220 1	
C2027	ECEA10Z47	Ceramic 10V	47 1	
C2028-2030	ECEA1HN2R2S	Electrolytic 50V	2.2 3	
C2031	ECKW1H102KB5	Ceramic 50V	0.001 1	
C2032	ECEA1ES3R3	Electrolytic 25V	3.3 1	
C2033	ECQMLH123KV or ECQMLH123KZ	Polyester 50V	0.012 1	
C2034	ECEA50ZR22	Electrolytic 50V	0.22 1	
C2035	ECEA0JS470	Electrolytic 6.3V	47 1	
C2036	ECEA25Z100	Electrolytic 25V	100 1	
C2037	ECQMLH103KV or ECQMLH103KZ	Polyester 50V	0.01 1	
C2038	ECEA1CS101	Electrolytic 16V	100 1	
C2039	ECEA50ZR22	Electrolytic 50V	0.22 1	
C2041	ECEA16Z10	Electrolytic 16V	10 1	
C2042	ECQV05334JZ	Polyester 50V	0.33 1	
			+5%	
C2043	ECEA1ES4R7	Electrolytic 25V	4.7 1	
C2044	ECEA50ZR47	Electrolytic 50V	0.47 1	
C2045	VCYW1E104KX	Ceramic 25V	0.1 1	
C2046	ECQV05184JZ	Polyester 50V	0.18 1	
			+5%	
C2047	ECQMLH102KV or ECQMLH102KZ	Polyester 50V	0.001 1	
C2048	ECQMLH104KV	Polyester 50V	0.1 1	
C2050	ECEA0JS330	Electrolytic 6.3V	33 1	
C2051	VCYW1C104MX	Ceramic 16V	0.1 1	
			+20%	
C4001,4002	ECEA50ZR22	Electrolytic 50V	0.22 2	
C4003	ECEA1ES4R7	Electrolytic 25V	4.7 1	
C4004	ECKF1H103ZV	Ceramic 50V	0.01 1	
			+80% -20%	
C4005	ECEA1CS330	Electrolytic 16V	33 1	
C4006	ECEA50ZR15	Electrolytic 50V	0.15 1	
C4007	ECEA50ZR1	Electrolytic 50V	0.1 1	
C4008,4009	ECEA1CS100	Electrolytic 16V	10 2	
C4010	ECEA1HS010	Electrolytic 50V	1 1	
C4011	ECEA1CS100	Electrolytic 16V	10 1	
C4012	ECEA1ES4R7	Electrolytic 25V	4.7 1	
C4013,4014	ECEA1HS010	Electrolytic 50V	1 2	
C4015	ECEA1CS100	Electrolytic 16V	10 1	
C4016	ECEA1CS330	Electrolytic 16V	33 1	
C4017	ECCW2H221K	Ceramic 500V	220P 1	
C4018	ECKF1H103ZV	Ceramic 50V	0.01 1	
			+80% -20%	
C4019	ECQM4822KZ	Polyester 400V	0.0082 1	
C4020	VCYW1E223KX	Ceramic 25V	0.022 1	
C4021	ECEA1CS470	Electrolytic 16V	47 1	
C4022	VCYW1E103KX	Ceramic 25V	0.01 1	
C4023	ECKW1H122KB5	Ceramic 50V	0.0012 1	
C4024	ECEA25M4R7S	Electrolytic 25V	4.7 1	
C4025	ECEA1CS220	Electrolytic 16V	22 1	
C4026	ECQV05333JZ	Polyester 50V	0.033 1	
			+5%	
C4027	ECEA50ZR33	Electrolytic 50V	0.33 1	
C4028	VCYW1E103KX	Ceramic 25V	0.01 1	
C4029	ECEA1CS330	Electrolytic 16V	33 1	
C4030	ECEA1CS100	Electrolytic 16V	10 1	
C4031	ECEA1CS470	Electrolytic 16V	47 1	
C4032	ECKW1H102KB5	Ceramic 50V	0.001 1	
C4033	VCYW1E563K	Ceramic 25V	0.056 1	
C4034	VCYST50102KB	Ceramic 50V	0.001 1	
C6001	ECEA1HS010	Electrolytic 50V	1 1	
C6002	ECCW1H080CC5	Ceramic 50V	8P 1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		+0.25PF		
C6004	ECRHA020D11 or MCW03R200ER	Trimmer 20P	1	
C6005	ECKW1H103ZF5	Ceramic 50V	0.01 1	
			+80% -20%	
C6006	ECEA1AS221	Electrolytic 10V	220 1	
C6007	ECEA1CS100	Electrolytic 16V	10 1	
C6009	ECEA50ZR1	Electrolytic 50V	0.1 1	
C6010-6012	ECKW1H103ZF5	Ceramic 50V	0.01 1	
			+80% -20%	
C6013	ECEA1CS470	Electrolytic 16V	47 1	
C6016	ECQMLH104KV	Polyester 50V	0.1 1	
C6018	ECEA1CS471	Electrolytic 16V	470 1	
C6020	ECEA1HS010	Electrolytic 50V	1 1	
C6021	ECEA0JS221	Electrolytic 6.3V	220 1	
C6022	VCYW1C104MX	Ceramic 16V	0.1 1	
			+20%	
C6024	ECEA1CS100	Electrolytic 16V	10 1	
C6025,6026	ECEA1HS2R2	Electrolytic 50V	2.2 2	
C6028	VCYST50271KB	Ceramic 50V	270P 1	
C6029	ECEA1CS220	Electrolytic 16V	22 1	
C6030	ECKW1H103ZF5	Ceramic 50V	0.01 1	
			+80% -20%	
C6032	ECKW1H103ZF5	Ceramic 50V	0.01 1	
			+80% -20%	
C6033	ECCW1H101K	Ceramic 50V	100P 1	
C6035	ECEA1CN100S	Electrolytic 16V	10 1	
C6036	ECCW1H102K	Ceramic 50V	0.001 1	
C6037	ECCW1H472K	Ceramic 50V	0.0047 1	
C6038	ECEA0JS101	Electrolytic 6.3V	100 1	
C6040	VCYD1C104MX	Ceramic 16V	0.1 1	
			+20%	
C6041,6042	VCYW1E473KX	Ceramic 25V	0.047 2	
C6950	ECKW1H103ZF5	Ceramic 50V	0.01 1	
			+80% -20%	
		C/R Complex Components		
CR2001	EXRP223M222	50V	0.022 1	
			+20%	
			2.2K	
CR6001	EXRP103M223	50V	0.01 1	
			+20%	
			22K	
		Coils		
L2001	VLQS11H391K		390 1	
L2002	VLQS05F330K		33 1	
L4001	VLQS66F222K		2.2 1	
L4002	VLQS66F181K		180 1	
L4003	VLQS66F222K		2.2 1	
L6006	VLQS66F221K or VLQS05F221K		220 1	
		Crystals Oscillator		
X6001	V SX0071		1	
		Pin Headers		
P2002	VJPS0010		2P 1	
P2003	VJPS0011		3P 1	
P4001	VJPS0012		4P 1	
P6006	VJPS0012		4P 1	
P6007	VJPS0022		7P 1	
P6008	VJPS0011		3P 1	
P6009	VJPS0010		2P 1	
P6010	VJPS0011		3P 1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
P6012	VJPS0010	2P	1	
		Switch		
SW2001	VSSS0010	SP/LP/SLP SW	1	
		Transformer		
T4001	ELM7Q018E		1	
		Miscellaneous		
	VMTS0035	Cushion	2	
	VMX0549	P.C.B. Spacer	3	
	VSCS0285	Shield Case	1	
	VSCS0286	Shield Case	1	
	VSCS0287	Shield Case	1	
	VSCS0298	Shield Case	1	
	VWB0010	Clamper	1	
	VEKS1301	SUB SYSTEM CONTROL [I]C.B.A.	1	
	VEKS1333	SUB SYSTEM CONTROL [II]C.B.A.	1	
		OPERATION C.B.A.		
		Diodes		
D6501-6506	MA166		6	
D6510-6512	MA166		3	
D6514	MA166		1	
D6516	MA166		1	
D6518	MA166		1	
		Switches		
SW6501-6516	EVQ-QJ104K	PUSH SW	16	
		Miscellaneous		
	VMDS0190	Timer Display Tube Holder	1	
DP6501	VSZS0012	Display Tube	1	
		CHANNEL SELECTOR C.B.A.		
		Integrated Circuits		
IC7301	μPC1362C		1	
		Diodes		
D7301-7312	MA166C		12	
D7313-7324	MA166		12	
D7325-7336	LN31GCPHLM-U	L.E.D. Green	12	
		Resistors		
R7301-7312	EWEM2A401B24	Variable 20K	12	
R7313,7314	ERDS2TJ102	1K	2	
R7315	ERDS2TJ822	8.2K	1	
R7316,7317	ERDS2TJ153	15K	2	
R7318	ERDS2TJ223	22K	1	
R7319	ERDS2TJ561	560	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		Capacitors		
C7301	ECEB1HK010	Electrolytic 50V	1	1
C7302	ECEB1CK100	Electrolytic 16V	10	1
C7304	ECQM1H333KV	Polyester 50V	0.033	1
C7305	VCYST16103NY	Ceramic 16V	0.01	1
		+/-30%		
		Switches		
SW7301-7312	EVQ-REAK05	UHF/VHF BAND SELECT SW	12	
SW7313-7324	EVQ-QJ104K	PUSH SW	12	
SW7325	VSSS0005	AFT SW	1	
		Miscellaneous		
	VGNS0561	Tuning Knob Case	1	
		Decoration		
	VMDS0137	LED Spacer	1	
	VSCS0263	Shield Case	1	
		FUSE C.B.A.		
		Resistors		
R1028	ZRC122GK275	Solid 1/2W 2.7M	1	⚠
		+/-10%		⚠
		Fuse		
F1001	XPALC10N0100	1A	1	⚠
F1002	XPALC30N0100	3A	1	⚠
		Miscellaneous		
	TJC6320	Fuse Holder	4	
	TMM7464	Clamper	1	
	VEKS1061	Lug Ass'y	1	
		TV DEMODULATOR UNIT		
		Integrated Circuits		
IC701	AN5125		1	
IC702	AN5215		1	
		Transistors		
Q701	2SC1047(C)		1	
Q702	2SB642(Q,R)		1	
Q703	2SD637(Q,R)		1	
		Resistors		
R701	ERDS2TJ680	68	1	
R702,703	ERDS2TJ562	5.6K	2	
R704	ERDS2TJ391	390	1	



Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R705	ERDS2TJ271		270 1	
R706	ERDS2TJ821		820 1	
R707	ERDS2TJ564		560K 1	
R708-710	ERDS2TJ102		1K 3	
R711	ERDS2TJ183		18K 1	
R712	ERDS2TJ470		47 1	
R713	ERDS2TJ561		560 1	
R714	ERDS2TJ184		180K 1	
R715	ERDS2TJ152		1.5K 1	
R716	ERDS2TJ221		220 1	
R717	ERDS2TJ470		47 1	
R718	ERDS2TJ102		1K 1	
R719	ERDS2TJ272		2.7K 1	
R720	ERDS2TJ680		68 1	
R721	ERDS2TJ821		820 1	
R722	ERDS1TJ680	1/2W	68 1	
R723	ERDS2TJ330		33 1	
R724	ERDS1TJ101	1/2W	100 1	
R725	ERDS2TJ561		560 1	
R726	ERDS2TJ222		2.2K 1	
R727	ERDS2TJ222		22 1	
R728,729	ERDS2TJ222		2.2K 2	
R730	AVNE4A08473	Variable	47K 1	
R732	ERDS2TJ392		3.9K 1	
		Capacitors		
C701,702	ECCW1H150JC5	Ceramic 50V 15P	2	
		+5%		
C703	ECCW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C705-707	ECCW1H103ZF5	Ceramic 50V 0.01	3	
		+80% -20%		
C708	ECEALHK010	Electrolytic 50V	1 1	
C709	EQQV1H224J2	Polyester 50V 0.22	1	
		+5%		
C710	ECCW1H120JC5	Ceramic 50V 12P	1	
		+5%		
C711	ECCW1H820JL5	Ceramic 50V 82P	1	
		+5%		
C712	ECSF1CD474KD or ECSF16R47K	Tantalum 16V 0.47	1	
C713-717	ECCW1H103ZF5	Ceramic 50V 0.01	5	
		+80% -20%		
C718	ECCW1H040CC5	Ceramic 50V 4P	1	
		+0.25PF		
C719	ECCW1H030CP5	Ceramic 50V 3P	1	
		+0.25PF		
C720	ECCW1H150JC5	Ceramic 50V 15P	1	
		+5%		
C721	EQQV1H473J2	Polyester 50V 0.047	1	
		+5%		
C722	ECEALCK470	Electrolytic 16V 47	1	
C723	ECCW1H560JC5	Ceramic 50V 56P	1	
		+5%		
C724	ECCW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C725	ECEALHK010	Electrolytic 50V	1 1	
C726	EQQV1H822KV or EQQV1H822KZ	Polyester 50V 0.0082	1	
C727	ECCW1H220JC5	Ceramic 50V 22P	1	
		+5%		
C728	ECEALCK470	Electrolytic 16V 47	1	
C729,730	ECSF1CD225D	Tantalum 16V 22	2	
C731	VCYS050391K	Ceramic 50V 390P	1	
C732	ECCF1H101J or ECCF1H101K	Ceramic 50V 100	1	
		+5%		

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
C733	ECCW1H390JC5	Ceramic 50V 39P	1	
		+5%		
		Filters		
FL701	EFCS4R5MM3 or TFCS4R5MM3	Ceramic	1	
FL702	EFCS4R5MS4 or SFE4R5MB4	Ceramic	1	
FL703	EPCA4R5MC3A	Ceramic	1	
FL704	VLFS0004		1	
		Coils		
L701	TLQR27N205C		0.27 1	
L702	TLQR56N205C		0.56 1	
L703	TLQR47N205C		0.47 1	
L704	VLQS66F3R3K		3.3 1	
L705,706	VLQS66F4R7K		4.7 2	
L707	VLQS66F120K		12 1	
L708	VLQS66F4R7K		4.7 1	
L709	VLQS66F680K		68 1	
L710	VLQS66F560K		56 1	
L711	VLQS66F330K		33 1	
L712	VLQLA03D181K		180 1	
L713	VLQLA03D120K		12 1	
		Transformers		
T701	EIV7F009A		1	
T702	EIV7F009B		1	
		Miscellaneous		
	VEPS0757	TV Demodulator C.B.A.	1	
	VJHS0019	If Pack Lead Pin	13	
	VMTS0035	Cushion	1	
	VSCS0276	Shield Case	1	
	VSCS0277	Shield Case	1	
	VSCS0278	Shield Case	1	
	VSCS0280	Shield Case	1	
		MODE SELECT SWITCH C.B.A.		
		Diodes		
D1571-1574	MA165		4	
		Switches		
SW1553	VSSS0009 or VSSS0011	MODE SELECT SW	1	
		SENSOR LED C.B.A.		
		Diodes		
D6551,6552	LN58	L.F.D.	2	



# Service Manual

**VHS** Video Cassette Recorder

## PV-1220

**Supplementary**

**Subject:** NEW SERVO, AUDIO &  
SYSTEM CONTROL CIRCUIT



Since the SERVO, AUDIO & SYSTEM CONTROL Circuit Board has been redesigned, use this supplementary service manual when servicing the unit with this board.

### 1. Contents

#### 1-1 Tentative Modifications.

##### A. Circuit Board Diagram.

These modifications are effective from Serial NO. D3MA81716 to F3SA22000.

#### 1-2 Final Modifications.

##### A. Schematic Diagram.

##### B. Circuit Board Diagram.

##### C. Electrical Replacement Parts List.

These modifications are effective from Serial NO. F3SA60001.

### 2. Note

Please insert this Supplementary Service Manual PV-1220 into the original binder (VRD-8303-369).

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Division of Matsushita Electric  
of Puerto Rico, Inc.  
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Victoria Industrial Park  
Carolina, Puerto Rico 00630

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SERVO, AUDIO & SYSTEM CONTROL CIRCUIT VOLTAGE CHART (FINAL).....	4
ELECTRICAL REPLACEMENT PARTS LIST (FINAL) .....	5
(SERVO, AUDIO & SYSTEM CONTROL C.B.A.)	

## Note: Tentative Modifications

The modifications to the diagram of the Servo, Audio, System Control C.B.A. resulted in the inclusion of Sub System Control [I] and [II] into the Servo, Audio, System Control C.B.A.

Therefore no other modifications have been made to any other Parts of the Service Manual.


## IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are shaded on the schematic diagram and on the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire, or other hazards. Do not modify the original design without permission of manufacturer.



<TENTATIVE>

# SERVO, AUDIO & SYSTEM CONTROL C.B.A. (VEPS0232A1)

**IMPORTANT SAFETY NOTICE:**  
COMPONENTS IDENTIFIED BY THE SIGN  HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SPECIFIED PARTS.




VOLTAGE MEASUREMENT

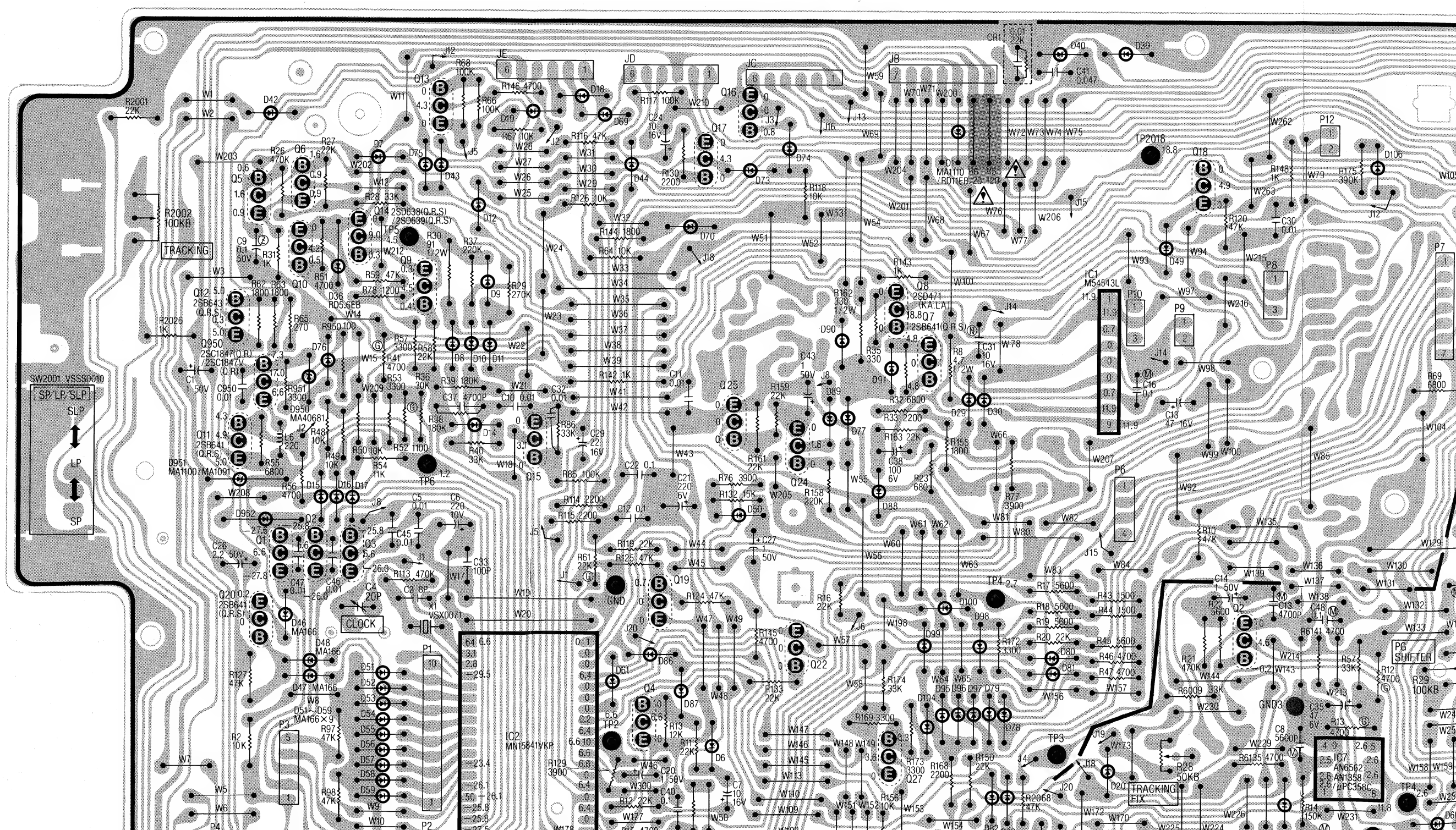
P6001	
1	SEGMENT h
2	SEGMENT i
3	SEGMENT g
4	SEGMENT f
5	SEGMENT e
6	SEGMENT d
7	SEGMENT c
8	SEGMENT d
9	SEGMENT a
10	

P6002	
1	GRID 1G
2	GRID 2G
3	GRID 3G
4	GRID 4G
5	GRID 5G
6	GRID 6G
7	GRID 7G
8	GRID 8G
9	GRID 9G
10	GRID 10G

P6003	
1	SCAN1/GRID 11G
2	GRID 12G
3	SCAN3/GRID 13G
4	GRID 14G
5	GRID 15G

P6004	
1	DATA IN 1
2	DATA IN 2
3	DATA IN 3
4	DATA IN 4
5	DATA IN 5
6	DATA IN 6
7	DATA IN 7
8	GND
9	AC 4.2V
10	AC 4.2V

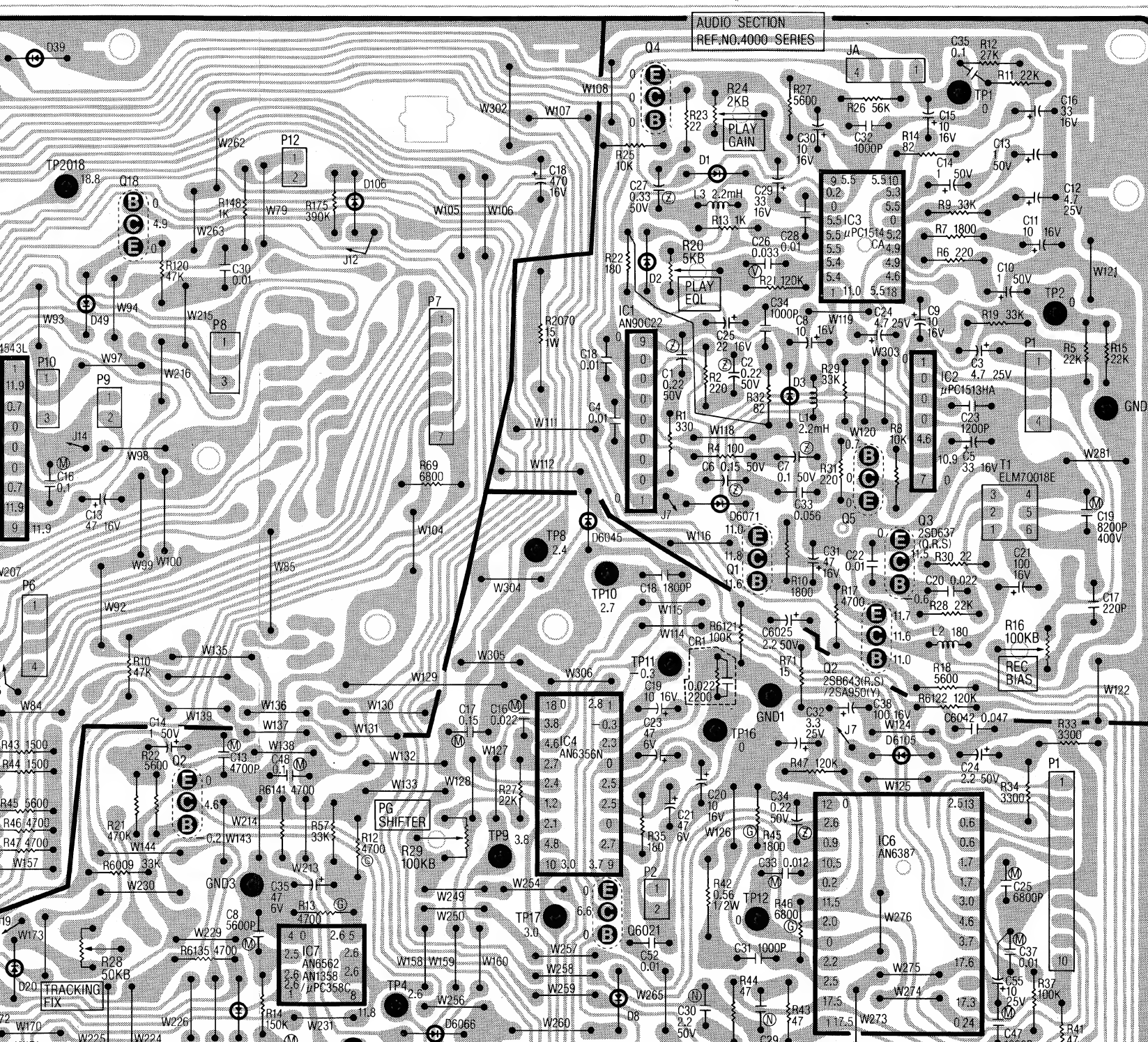
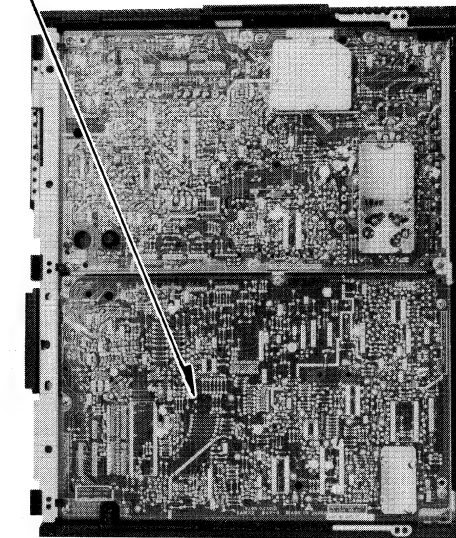
P6006	
1	EJECT 
2	CASSETTE DOWN 
3	SAFETY TAB 
4	UNDEC. 12V



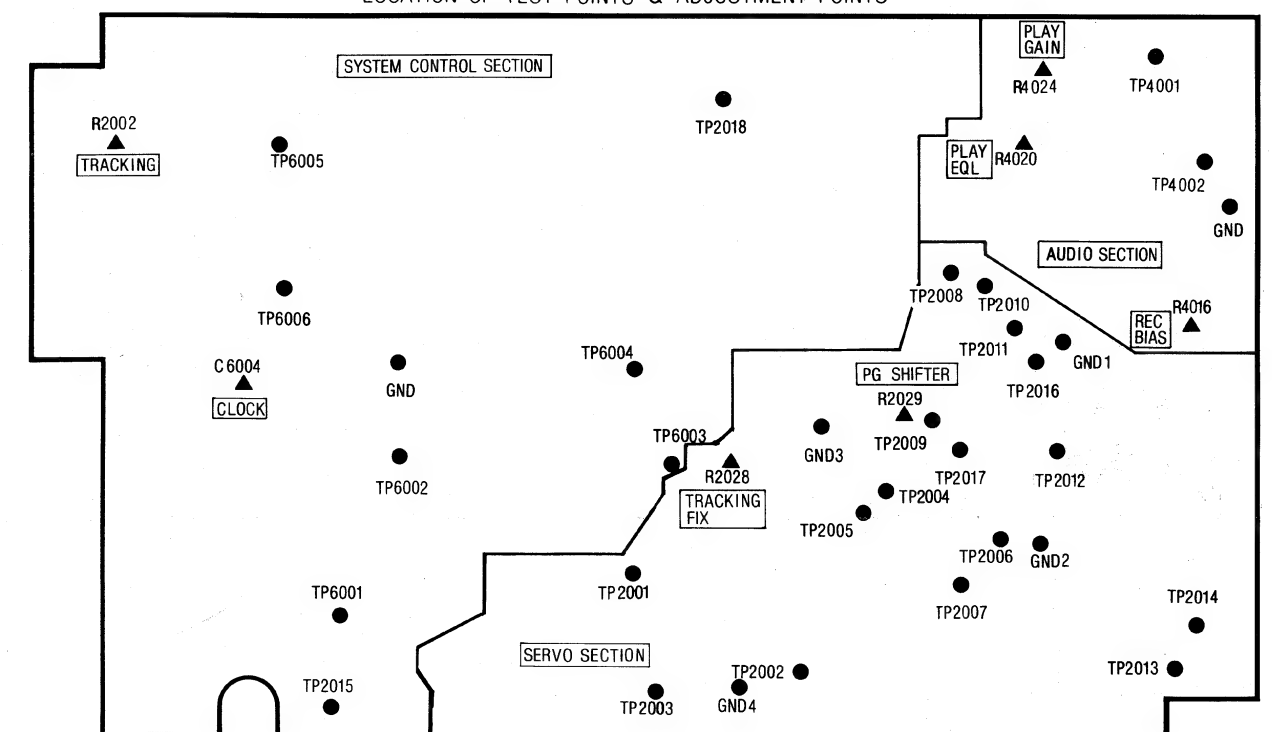


VOLTAGE MEASUREMENT: COLOR BAR SIGNAL  
IN SP REC MODE.

SERVO,AUDIO  
& SYSTEM CONTROL C.B.A.



### LOCATION OF TEST POINTS & ADJUSTMENT POINTS





# A

1	LOADINGⓂUNLOADING
2	LOADINGⓂLOADING




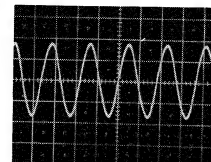
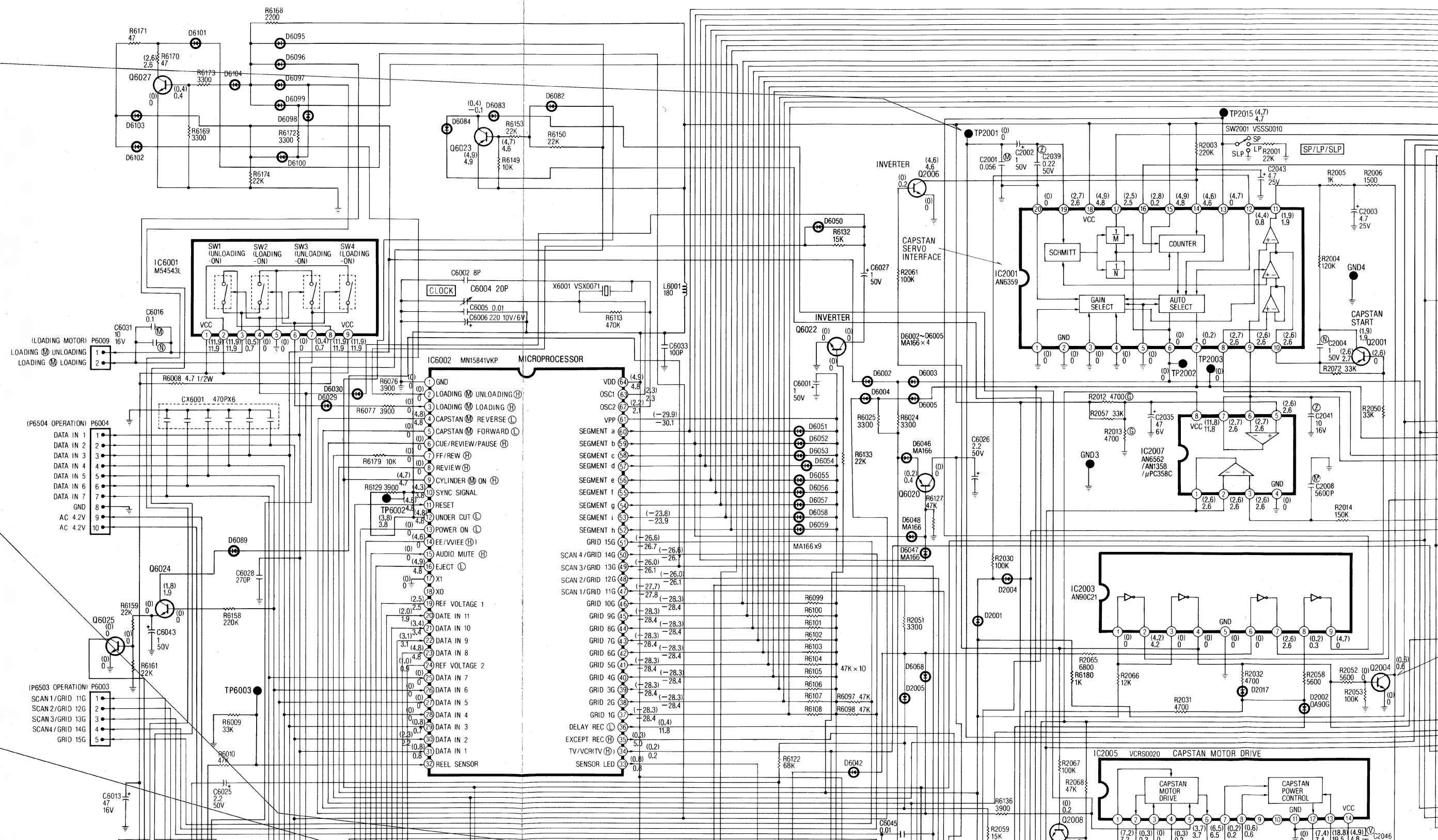
1	CONTROL HEAD
2	GND(CONTROL HEA



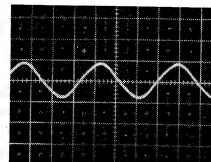


## SERVO, AUDIO & SYSTEM CONTROL SCHEMATIC DIAGRAM

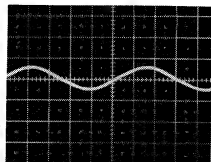
**IMPORTANT SAFETY NOTICE:**  
COMPONENTS IDENTIFIED BY THE SIGN  HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SPECIFIED PARTS.



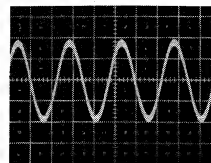
TP2001 REC. SP.  
0.5V/0.5msec. div.



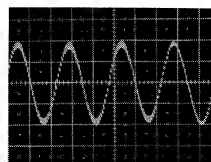
TP2001 REC. LP.  
0.5V/0.5msec. div.



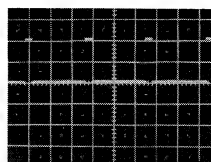
TP2001 REC. SLP.  
0.5V/0.5msec. div.



TP4001 REC. SP. LP. SLP.  
0.2V/1msec. div.



TP4001 PLAY. SP. LP. SLP.  
0.2V/1msec. div.

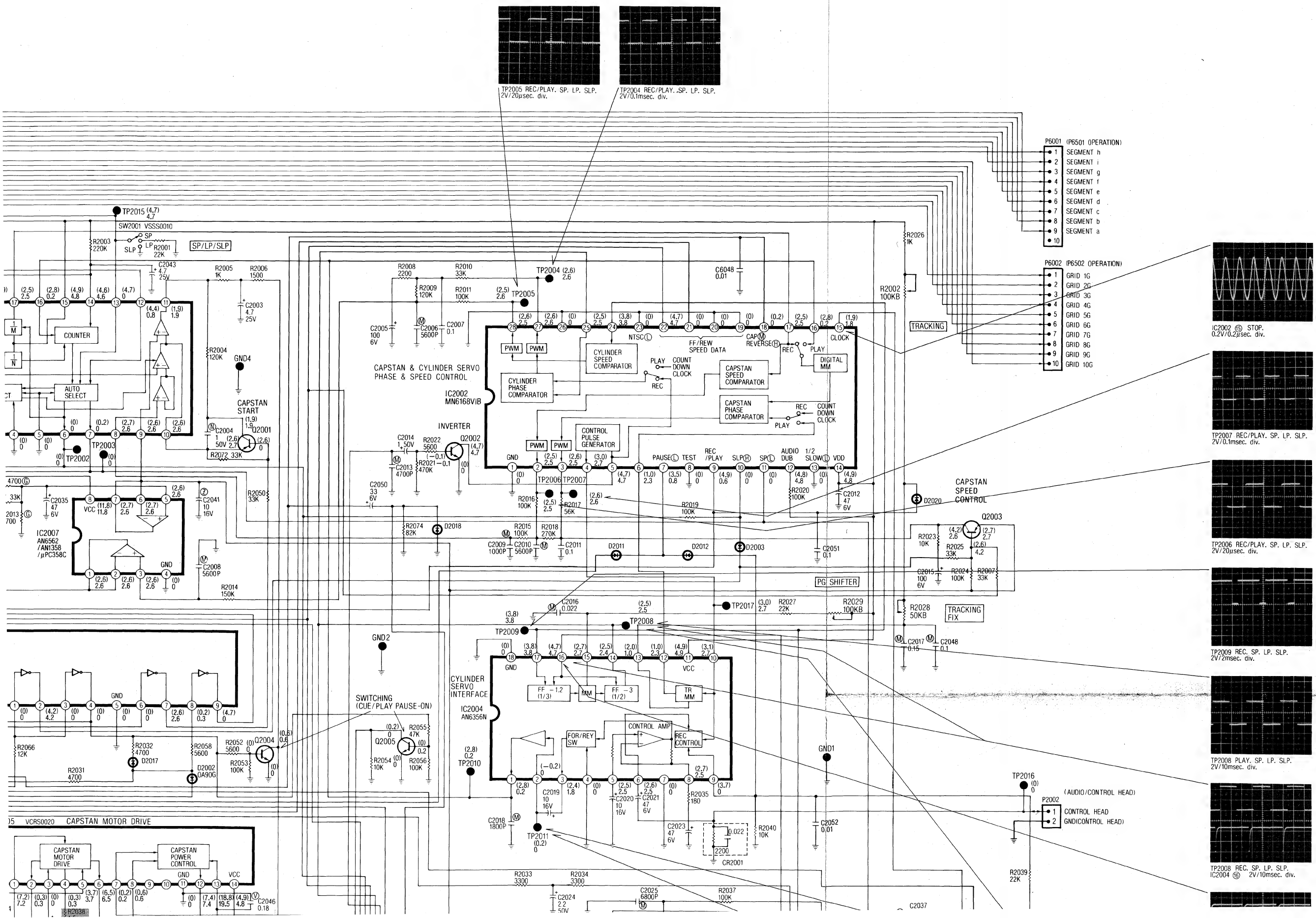


TP6001 STOP.  
2V/5msec. div.

HAVE SPECIAL  
FETY  
PONENTS USE ONLY THE

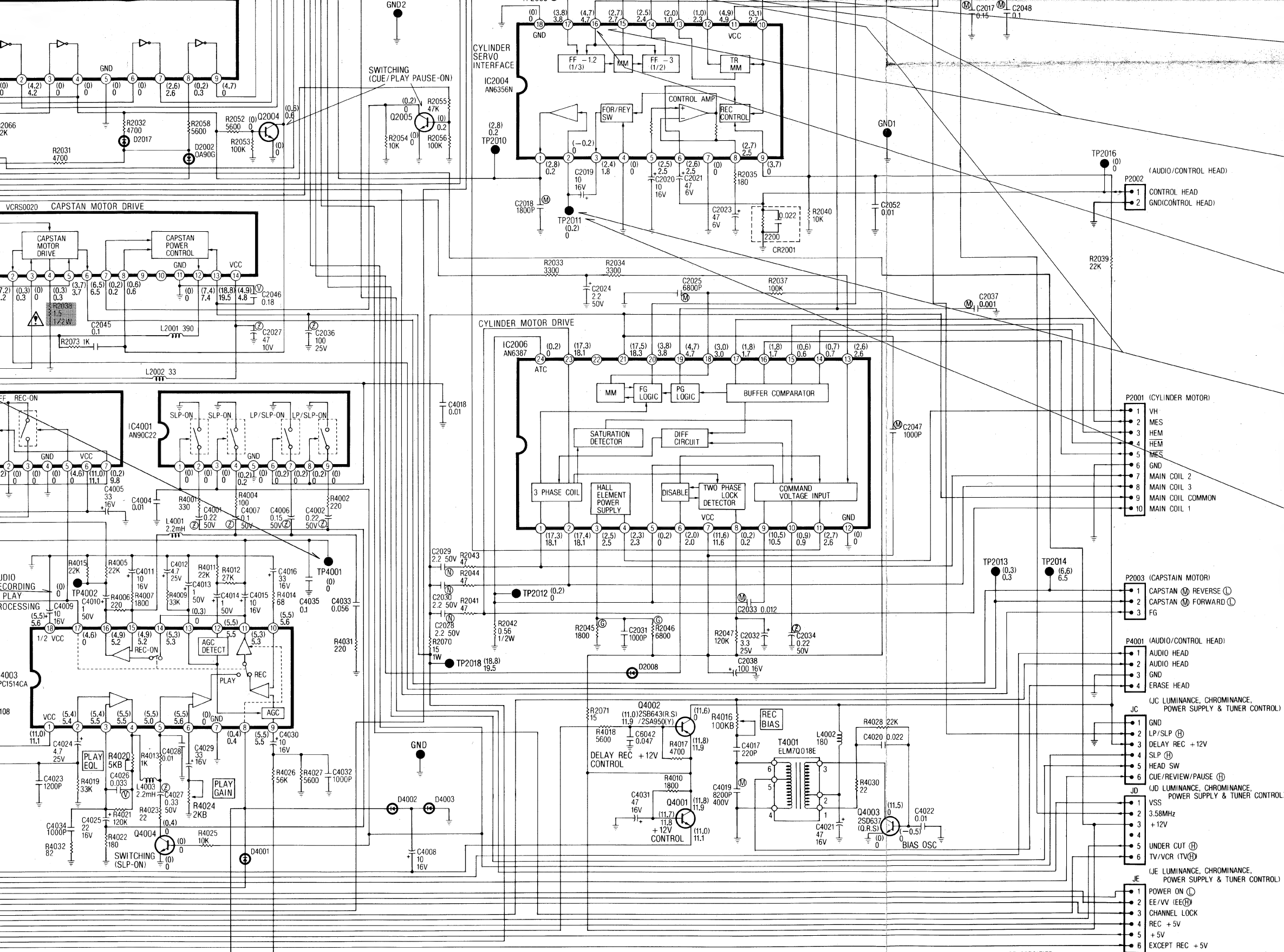
VOLTAGE MEASUREMENT:  
COLOR BAR SIGNAL IN SP REC MODE WITH BRACKET.  
COLOR BAR SIGNAL IN SP PLAY MODE WITHOUT BRACKET.

CALLOUTS NEXT TO WIRING PLUGS INDICATE  
CONNECTIONS TO OTHER SCHEMATIC DIAGRAM.

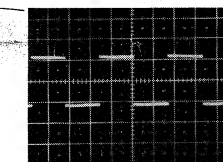




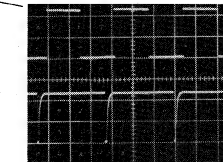




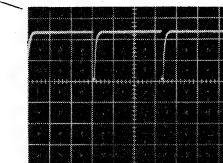
TP2009 REC. SP. LP. SLP.  
2V/2msec. div.



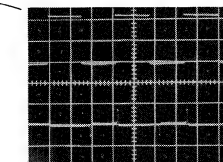
TP2008 PLAY. SP. LP. SLP.  
2V/10msec. div.



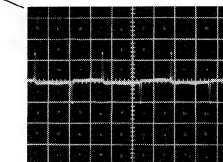
TP2008 REC. SP. LP. SLP.  
IC2004 2V/10msec. div.



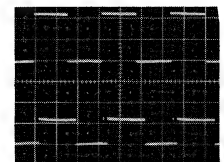
IC2004 2V/10msec. div.



TP2008 PLAY. SP. LP. SLP.  
TP2011 2V/10msec. div.



TP2011 PLAY. SP. LP. SLP.  
1V/10msec. div.



TP2008 REC. SP. LP. SLP.  
TP2011 2V/10msec. div.

- P2001 (CYLINDER MOTOR)
- 1 VH
  - 2 MES
  - 3 HEM
  - 4 HEM
  - 5 MES
  - 6 GND
  - 7 MAIN COIL 2
  - 8 MAIN COIL 3
  - 9 MAIN COIL COMMON
  - 10 MAIN COIL 1

- P2003 (CAPSTAN MOTOR)
- 1 CAPSTAN REVERSE
  - 2 CAPSTAN FORWARD
  - 3 FG

- P4001 (AUDIO/CONTROL HEAD)
- 1 AUDIO HEAD
  - 2 AUDIO HEAD
  - 3 GND
  - 4 ERASE HEAD

- JC (LUMINANCE, CHROMINANCE, POWER SUPPLY & TUNER CONTROL)
- 1 GND
  - 2 LP/SLP
  - 3 DELAY REC +12V
  - 4 SLP
  - 5 HEAD SW
  - 6 CUE/REVIEW/PAUSE

- JD (LUMINANCE, CHROMINANCE, POWER SUPPLY & TUNER CONTROL)
- 1 VSS
  - 2 3.58MHz
  - 3 +12V
  - 4 UNDER CUT
  - 5 TV/VCR (TV)
  - 6 TV/VCR (TV)


- JE (LUMINANCE, CHROMINANCE, POWER SUPPLY & TUNER CONTROL)
- 1 POWER ON
  - 2 EE/VV (EE)
  - 3 CHANNEL LOCK
  - 4 REC +5V
  - 5 +5V
  - 6 EXCEPT REC +5V

UNLESS OTHERWISE SPECIFIED:  
NPN TRANSISTORS ARE 2SD636 (Q.R.S.).  
PNP TRANSISTORS ARE 2SB641 (Q.R.S.).  
DIODES ARE MA165/1SS119 AND  
WATTAGE OF RESISTORS ARE 1/4W.

VJBS0232



SERVO, AUDIO & SYSTEM CONTROL C.B.A. (VEPS0232A2)

IMPORTANT SAFETY NOTICE:  
COMPONENTS IDENTIFIED BY THE SIGN  HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS USE ONLY THE SPECIFIED PARTS.

VOLTAGE MEASUREMENT: COLOR BAR SIGNAL IN SP REC MODE.

P6001

1	SEGMENT h
2	SEGMENT i
3	SEGMENT g
4	SEGMENT f
5	SEGMENT e
6	SEGMENT d
7	SEGMENT c
8	SEGMENT b
9	SEGMENT a
10	

P6002

1	GRID 1G
2	GRID 2G
3	GRID 3G
4	GRID 4G
5	GRID 5G
6	GRID 6G
7	GRID 7G
8	GRID 8G
9	GRID 9G
10	GRID 10G




P6003

1	SCAN1/GRID 11G
2	SCAN2/GRID 12G
3	SCAN3/GRID 13G
4	SCAN4/GRID 14G
5	GRID 15G

P6004

1	DATA IN 1
2	DATA IN 2
3	DATA IN 3
4	DATA IN 4
5	DATA IN 5
6	DATA IN 6
7	DATA IN 7
8	GND
9	AC 4.2V
10	AC 4.2V

P6006

1	EJECT 
2	CASSETTE DOWN 
3	SAFETY TAB 
4	UNREG +18V

P6007

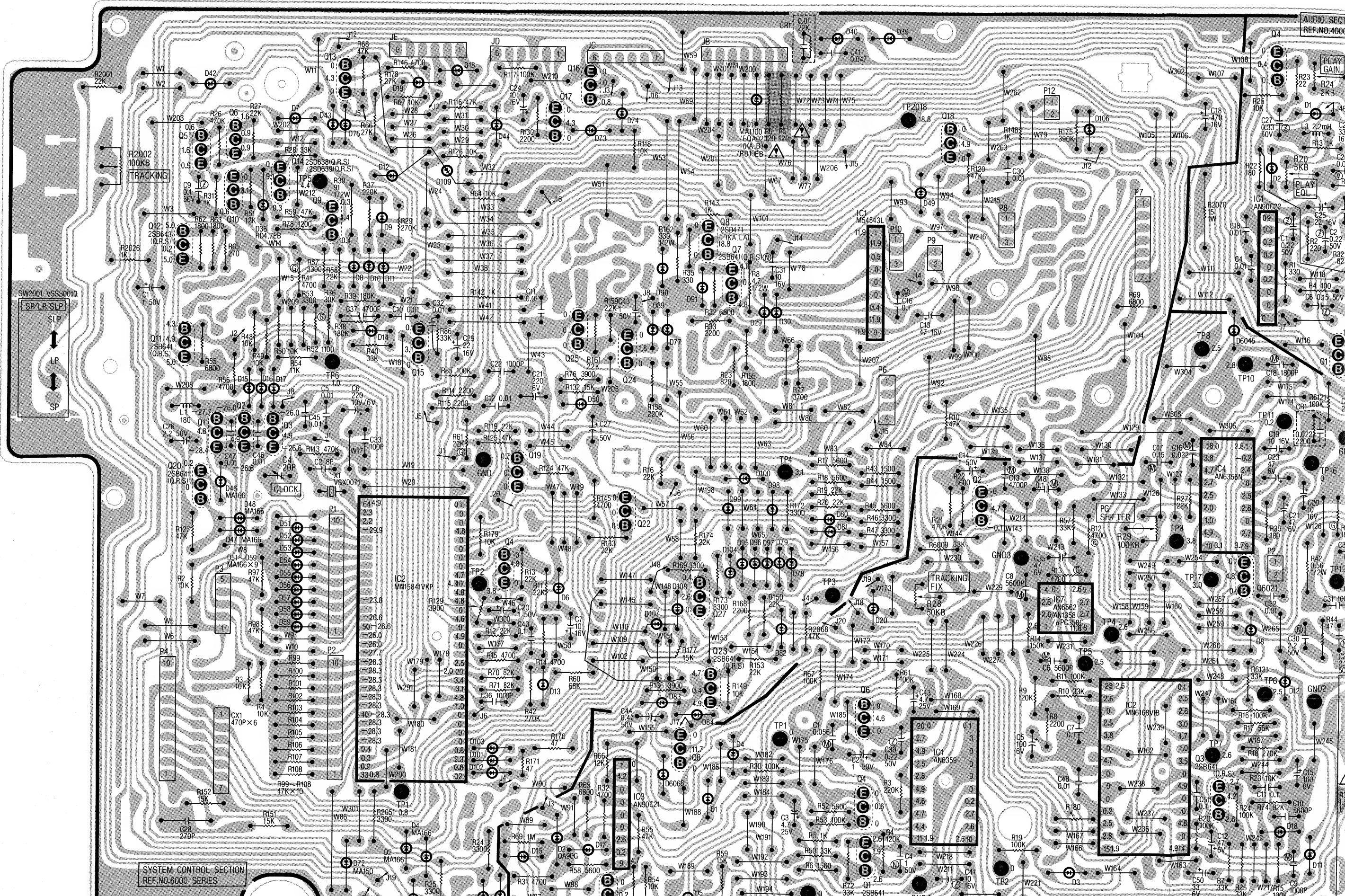
1	SAFETY TAB
2	POSITION 1
3	POSITION 2
4	POSITION 3
5	REEL SENSOR
6	GND
7	UNSWITCH +12V(2)

P6008

1	SUPPLY PHOTO TR
2	TAKEUP PHOTO TR
3	GND


P6009

1	LOADING@UNLOADING
2	LOADING@LOADING

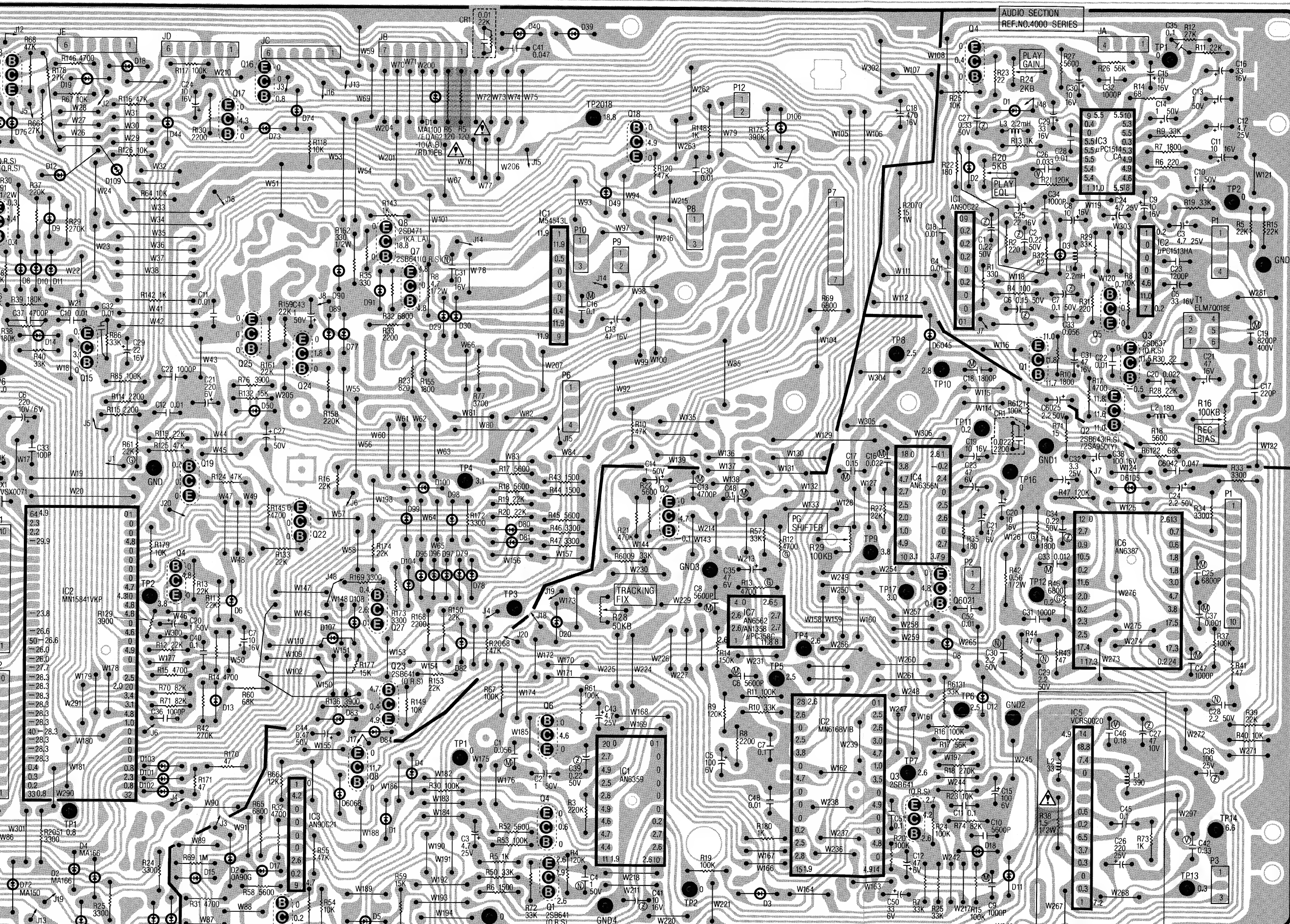




(VEPS0232A2)

**IMPORTANT SAFETY NOTICE:**  
COMPONENTS IDENTIFIED BY THE SIGN  HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SPECIFIED PARTS.

VOLTAGE MEASUREMENT: COLOR BAR SIGNAL  
IN SP REC MODE.





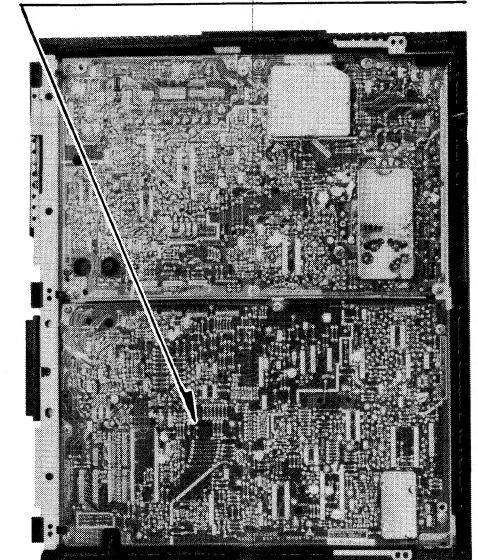
# B



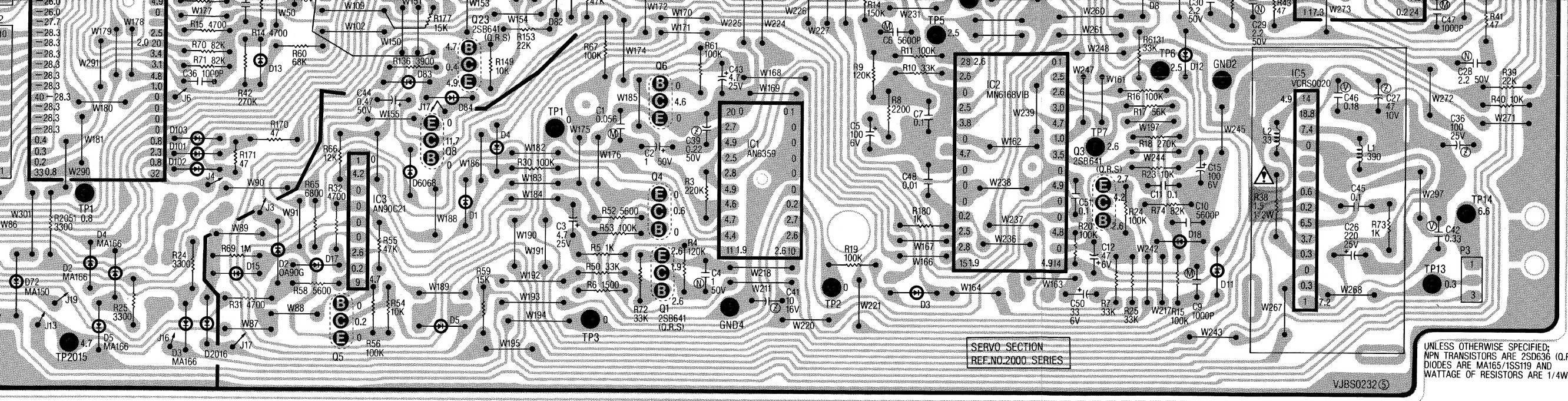
1	CAPSTAN (M) REVERSE (L)
2	CAPSTAN (M) FORWARD (L)
3	FG

SYSTEM CONTROL SECTION	
Q6001	6-C
Q6002	6-C
Q6003	6-C
Q6004	4-C
Q6005	3-B
Q6006	3-B
Q6007	3-B
Q6008	3-B
Q6009	4-C
Q6010	6-B
Q6011	4-B
Q6012	4-B
Q6013	4-B
Q6014	4-C
Q6015	4-B
Q6016	5-C
Q6017	5-C
Q6018	3-B
Q6019	4-C
Q6020	6-F
Q6021	5-B
Q6022	5-F
Q6023	4-G
Q6024	2-E
Q6025	2-E
Q6027	2-G

AUDIO SECTION	
Q4001	10-B
Q4002	10-B
Q4003	11-A
Q4004	7-A
Q4005	6-C







1	AUDIO
2	AUDIO
3	REMOTE PAUSE
4	4 MODE REMOTE

1	AC 4.2V
2	AC 4.2V
3	-28V
4	+5V
5	UNREG +18V
6	UNSWITCH +12V(2)
7	GND (POWER)

1	GND
2	LP/SLP ⊕
3	DELAY REC +12V
4	SLP ⊕
5	HEAD SW
6	CUE/REVIEW/PAUSE ⊕

1	VSS
2	3.58MHz
3	+12V
4	
5	UNDER CUT ⊕
6	TV/VCR (TVⓈ)

1	POWER ON ⊖
2	EE/VV (EEⓈ)
3	CHANNEL LOCK
4	REC +5V
5	+5V
6	EXCEPT REC +5V

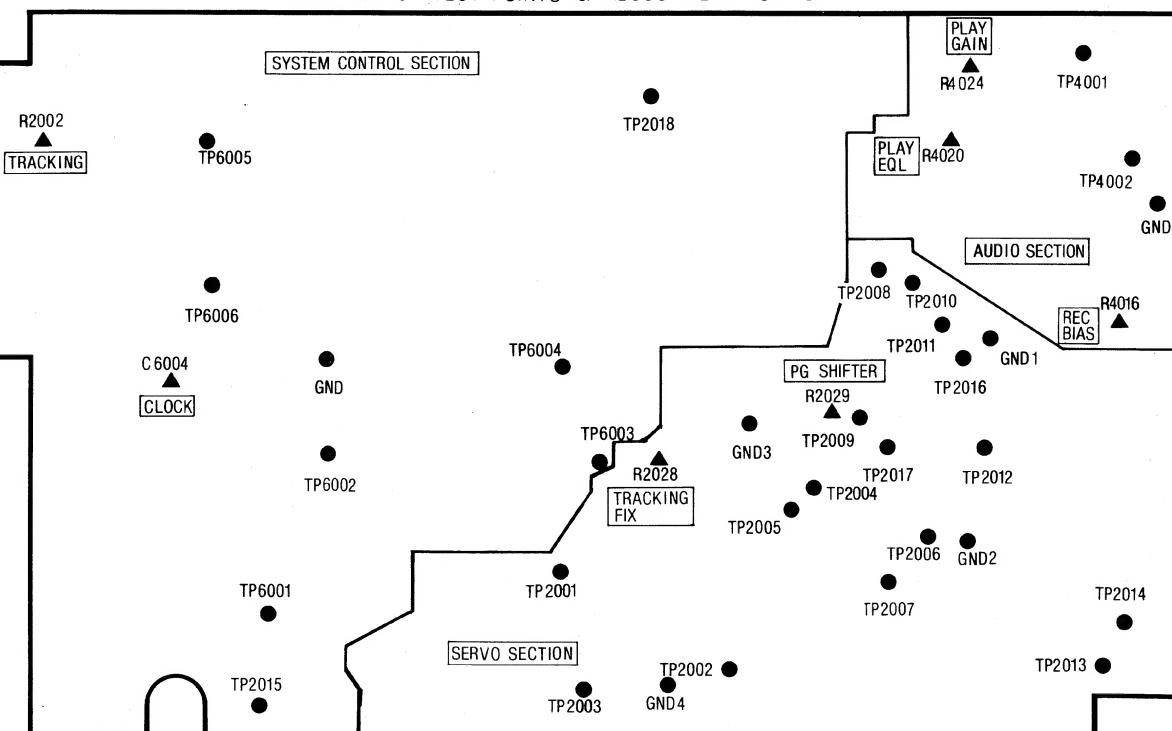
1	VH+
2	MES
3	HEM
4	HEM
5	MES
6	GND
7	MAIN COIL 2
8	MAIN COIL 3
9	MAIN COIL COMMON
10	MAIN COIL 1

1	CONTROL HEAD
2	GND/CONTROL HEAD

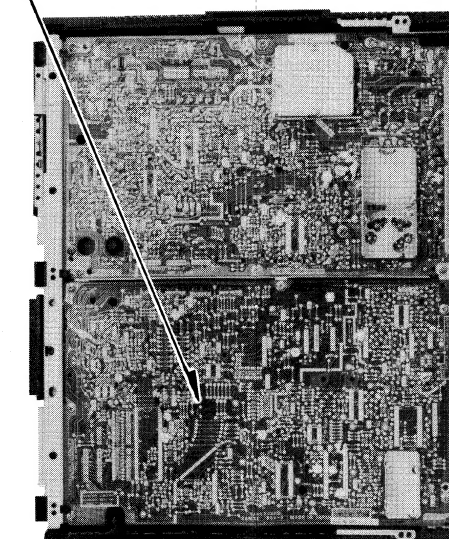
1	CAPSTAN ⊕ REVERSE ⊖
2	CAPSTAN ⊕ FORWARD ⊖
3	FG

1	AUDIO HEAD
2	AUDIO HEAD
3	GND
4	ERASE HEAD

LOCATION OF TEST POINTS & ADJUSTMENT POINTS



SERVO, AUDIO & SYSTEM CONTROL C.B.A.




SERVO SECTION	
Q1	5-B
Q2	6-C
Q3	7-B
Q4	5-B
Q5	4-B
Q6	5-B
Q8	4-B

AUDIO SECTION	
Q1	7-D
Q2	8-D
Q3	8-D
Q4	7-E
Q5	8-D

SYSTEM CONTROL SECTION	
Q 1	2-D
Q 2	2-D
Q 3	3-D
Q 4	4-C
Q 5	2-E
Q 6	2-E
Q 7	5-D
Q 8	4-E
Q 9	3-E
Q10	2-E
Q11	2-D
Q12	2-E
Q13	3-E
Q14	3-E
Q15	3-D
Q16	4-E
Q17	4-E
Q18	6-E
Q19	4-C
Q20	2-C
Q21	7-C
Q22	4-C
Q23	5-B
Q24	4-D
Q25	4-D
Q27	5-C

ELECTRICAL REPLACEMENT PARTS LIST

Model No. PV-1220

Note:  
1. Be sure to make your orders of replacement parts according to this list.  
2. IMPORTANT SAFETY NOTICE  
Components identified by the sign  have special characteristics important for safety. When replacing any of these components, use only the specified parts.  
3. Unless otherwise specified:  
All resistors are in OHMS ( $\Omega$ ), 1/4W,  $\pm 5\%$  carbon, K=1,0002, M=1,000K2.  
All capacitors are in MICROFARADS ( $\mu F$ ),  $\pm 10\%$  P= $\mu F$ .  
All coils are in MICROHENRIES ( $\mu H$ ), m= $10^3 \mu$ ,  $\pm 10\%$   
4. C.B.A: Circuit Board Assembly.  
5. P.C.B: Print Circuit Board.

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
	VEFS0232A2	SERVO / AUDIO / SYSTEM CONTROL C.B.A.		
		Integrated Circuits		
IC2001	AN6359		1	
IC2002	MN6168VIB		1	
IC2003	AN90C21		1	
IC2004	AN6356N		1	
IC2005	VCRS0020		1	
IC2006	AN6387		1	
IC2007	AN1358 or AN6562		1	
	$\mu$ PC358C			
IC4001	AN90C22		1	
IC4002	$\mu$ PC1513HA		1	
IC4003	$\mu$ PC1514CA		1	
IC6001	M54543L		1	
IC6002	MN15841VKP		1	
		Transistors		
Q2001	2SB641(Q,R,S)		1	
Q2002	2SD636(Q,R,S)		1	
Q2003	2SB641(Q,R,S)		1	
Q2004-2006	2SD636(Q,R,S)		3	
Q2008	2SD636(Q,R,S)		1	
Q4001	2SD636(Q,R,S)		1	
Q4002	2SA950(Y) or 2SB643(R,S)		1	
Q4003	2SD637(Q,R,S)		1	
Q4004,4005	2SD636(Q,R,S)		2	
Q6001-6006	2SD636(Q,R,S)		6	
Q6007	2SB641(Q,R,S)		1	
Q6008	2SD471(KA,LA)		1	
Q6009,6010	2SD636(Q,R,S)		2	
Q6011	2SB641(Q,R,S)		1	
Q6012	2SB643(Q,R,S)		1	
Q6013	2SD636(Q,R,S)		1	
Q6014	2SD638(Q,R,S) or 2SD639(Q,R,S)		1	
Q6015-6019	2SD636(Q,R,S)		5	
Q6020	2SB641(Q,R,S)		1	
Q6021,6022	2SD636(Q,R,S)		2	
Q6023	2SB641(Q,R,S)		1	
Q6024,6025	2SD636(Q,R,S)		2	
Q6027	2SD636(Q,R,S)		1	
		Diodes		
D2001	MA165 or 1SS119		1	
D2002	0A90G	GE	1	
D2003-2005	MA165 or 1SS119		3	
D2008	MA165 or 1SS119		1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
D2011,2012	MA165 or 1SS119		2	
D2015-2018	MA165 or 1SS119		4	
D2020	MA165 or 1SS119		1	
D4001-4003	MA165 or 1SS119		3	
D6001	MA1100 or EQA02-10(A,B) or RD10EB	Zener	1	
D6002-6005	MA166		4	
D6006-6019	MA165 or 1SS119		14	
D6029,6030	MA165 or 1SS119		2	
D6036	RD4.7EB	Zener	1	
D6039,6040	MA165 or 1SS119		2	
D6042-6045	MA165 or 1SS119		4	
D6046-6048	MA166		3	
D6049,6050	MA165 or 1SS119		2	
D6051-6059	MA166		9	
D6068	MA165 or 1SS119		1	
D6072	MA150		1	
D6073-6075	MA165 or 1SS119		3	
D6077-6084	MA165 or 1SS119		8	
D6089	MA165 or 1SS119		1	
D6090,6091	MA165 or 1SS119		2	
D6095-6109	MA165 or 1SS119		15	
		Resistors		
R2001	ERDS2TJ223		22K 1	
R2002	EVJFPAP20B15	Variable	100K 1	
R2003	ERDS2TJ224		220K 1	
R2004	ERDS2TJ124		120K 1	
R2005	ERDS2TJ102		1K 1	
R2006	ERDS2TJ152		1.5K 1	
R2007	ERDS2TJ333		33K 1	
R2008	ERDS2TJ222		2.2K 1	
R2009	ERDS2TJ124		120K 1	
R2010	ERDS2TJ333		33K 1	
R2011	ERDS2TJ104		100K 1	
R2012,2013	EROS2TKG4701	Precision Metal Film 4.7K $\pm 2\%$	2	
R2014	ERDS2TJ154		150K 1	
R2015,2016	ERDS2TJ104		100K 2	
R2017	ERDS2TJ563		56K 1	
R2018	ERDS2TJ274		270K 1	
R2019,2020	ERDS2TJ104		100K 2	
R2021	ERDS2TJ474		470K 1	
R2022	ERDS2TJ562		5.6K 1	
R2023	ERDS2TJ103		10K 1	
R2024	ERDS2TJ104		100K 1	
R2025	ERDS2TJ333		33K 1	
R2026	ERDS2TJ102		1K 1	
R2027	ERDS2TJ223		22K 1	
R2028	EVNE4AA00B54	Variable	50K 1	
R2029	EVN38CA00B15	Variable	100K 1	
R2030	ERDS2TJ104		100K 1	
R2031,2032	ERDS2TJ472		4.7K 2	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R2033,2034	ERDS2TJ332		3.3K 2	
R2035	ERDS2TJ181		180 1	
R2037	ERDS2TJ104		100K 1	
R2038	ERDS1PF1RS		1/2W 1.5 1	
R2039	ERDS2TJ223		22K 1	
R2040	ERDS2TJ103		10K 1	
R2041	ERDS2TJ470		47 1	
R2042	ERX12ANJR56	Metal Oxide 1/2W	0.56 1	
R2043,2044	ERDS2TJ470		47 2	
R2045	EROS2TKG1801	Precision Metal Film	1.8K $\pm 2\%$ 1	
R2046	EROS2TKG6801	Precision Metal Film	6.8K $\pm 2\%$ 1	
R2047	ERDS2TJ124		120K 1	
R2050	ERDS2TJ333		33K 1	
R2051	ERDS2TJ332		3.3K 1	
R2052	ERDS2TJ562		5.6K 1	
R2053	ERDS2TJ104		100K 1	
R2054	ERDS2TJ103		10K 1	
R2055	ERDS2TJ473		47K 1	
R2056	ERDS2TJ104		100K 1	
R2057	ERDS2TJ333		33K 1	
R2058	ERDS2TJ562		5.6K 1	
R2059	ERDS2TJ153		15K 1	
R2061	ERDS2TJ104		100K 1	
R2065	ERDS2TJ682		6.8K 1	
R2066	ERDS2TJ123		12K 1	
R2067	ERD25TJ104		100K 1	
R2068	ERDS2TJ473		47K 1	
R2069	ERDS2TJ105		1M 1	
R2070	ERGLANJ150	Metal Oxide 1W	15 1	
R2071	ERDS2TJ150		15 1	
R2072	ERDS2TJ333		33K 1	
R2073	ERDS2TJ102		1K 1	
R2074	ERDS2TJ823		82K 1	
R4001	ERDS2TJ331		330 1	
R4002	ERDS2TJ221		220 1	
R4004	ERDS2TJ101		100 1	
R4005	ERDS2TJ223		22K 1	
R4006	ERDS2TJ221		220 1	
R4007	ERDS2TJ182		1.8K 1	
R4008	ERDS2TJ103		10K 1	
R4009	ERDS2TJ333		33K 1	
R4010	ERDS2TJ182		1.8K 1	
R4011	ERDS2TJ223		22K 1	
R4012	ERDS2TJ273		27K 1	
R4013	ERDS2TJ102		1K 1	
R4014	ERDS2TJ680		68 1	
R4015	ERDS2TJ223		22K 1	
R4016	EVNE4AA00B15	Variable	100K 1	
R4017	ERDS2TJ472		4.7K 1	
R4018	ERDS2TJ562		5.6K 1	
R4019	ERDS2TJ333		33K 1	
R4020	EVNE4AA00B53	Variable	5K 1	
R4021	ERDS2TJ124		120K 1	
R4022	ERDS2TJ181		180 1	
R4023	ERDS2TJ220		22 1	
R4024	EVNE4AA00B23	Variable	2K 1	
R4025	ERDS2TJ103		10K 1	
R4026	ERDS2TJ563		56K 1	
R4027	ERDS2TJ562		5.6K 1	
R4028	ERDS2TJ223		22K 1	
R4029	ERDS2TJ333		33K 1	
R4030	ERDS2TJ220		22 1	
R4031	ERDS2TJ221		220 1	
R4032	ERDS2TJ820		82 1	
R6002-6004	ERDS2TJ103		10K 3	
R6005,6006	ERD2FCGP121		120 2	
R6008	ERDS1FJ4R7		1/2W 4.7 1	
R6009	ERDS2TJ333		33K 1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R6010	ERDS2TJ473		47K 1	
R6011-6013	ERDS2TJ223		22K 3	
R6014,6015	ERDS2TJ472		4.7K 2	
R6016	ERDS2TJ223		22K 1	
R6017,6018	ERDS2TJ562		5.6K 2	
R6019,6020	ERDS2TJ223		22K 2	
R6023	ERDS2TJ821		820 1	
R6024,6025	ERDS2TJ332		3.3K 2	
R6026	ERDS2TJ474		470K 1	
R6027	ERDS2TJ223		22K 1	
R6028	ERDS2TJ333		33K 1	
R6029	ERDS2TJ274		270K 1	
R6030	ERDS1TJ910		1/2W 91 1	
R6031	ERDS2TJ102		1K 1	
R6032	ERDS2TJ682		6.8K 1	
R6033	ERDS2TJ222		2.2K 1	
R6035	ERDS2TJ331		330 1	
R6036	ERDS2TJ303		30K 1	
R6037	ERDS2TJ224		220K 1	
R6038,6039	ERDS2TJ184		180K 2	
R6040	ERDS2TJ333		33K 1	
R6041	EROS2TKG4701	Precision Metal Film	4.7K $\pm 2\%$ 1	
R6042	ERDS2TJ274		270K 1	
R6043,6044	ERDS2TJ152		1.5K 2	
R6045	ERDS2TJ562		5.6K 1	
R6046,6047	ERDS2TJ332		3.3K 2	
R6048-6050	ERDS2TJ103		10K 3	
R6051	ERDS2TJ123		12K 1	
R6052	EROS2TKG1101	Precision Metal Film	1.1K $\pm 2\%$ 1	
R6053	ERDS2TJ332		3.3K 1	
R6054	ERDS2TJ113		11K 1	
R6055	ERDS2TJ682		6.8K 1	
R6056	ERDS2TJ472		4.7K 1	
R6057	ERDS2TJ332		3.3K 1	
R6058	ERDS2TJ223		22K 1	
R6059	ERDS2TJ473		47K 1	
R6060	ERDS2TJ683		68K 1	
R6061	EROS2CKG2202	Precision Metal Film	22K $\pm 2\%$ 1	
R6062,6063	ERDS2TJ182		1.8K 2	
R6064	ERDS2TJ103		10K 1	
R6065	ERDS2TJ271		270 1	
R6066	ERDS2TJ273		27K 1	
R6067	ERDS2TJ103		10K 1	
R6068	ERDS2TJ473		47K 1	
R6069	ERDS2TJ682		6.8K 1	
R6070,6071	ERDS2TJ823		82K 2	
R6076,6077	ERDS2TJ392		3.9K 2	
R6078	ERDS2TJ122		1.2K 1	
R6085	ERDS2TJ104		100K 1	
R6086	ERDS2TJ333		33K 1	
R6097-6108	ERDS2TJ473		47K 12	
R6113	ERDS2TJ474		470K 1	
R6114,6115	ERDS2TJ222		2.2K 2	
R6116	ERDS2TJ473		47K 1	
R6117	ERDS2TJ104		100K 1	
R6118	ERDS2TJ103		10K 1	
R6119	ERDS2TJ223		22K 1	
R6120	ERDS2TJ473		47K 1	
R6121	ERDS2TJ104		100K 1	
R6122	ERDS2TJ683		68K 1	
R6124,6125	ERDS2TJ473		47K 2	
R6126	ERDS2TJ103		10K 1	
R6127	ERDS2TJ473		47K 1	
R6129	ERDS2TJ392		3.9K 1	
R6130	ERDS2TJ222		2.2K 1	
R6131	ERDS2TJ333		33K 1	
R6132	ERDS2TJ153		15K 1	

